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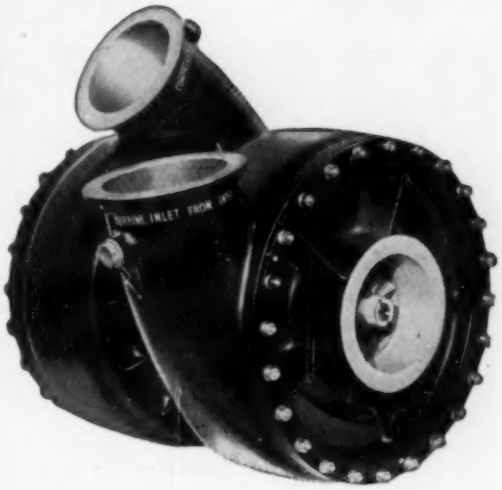

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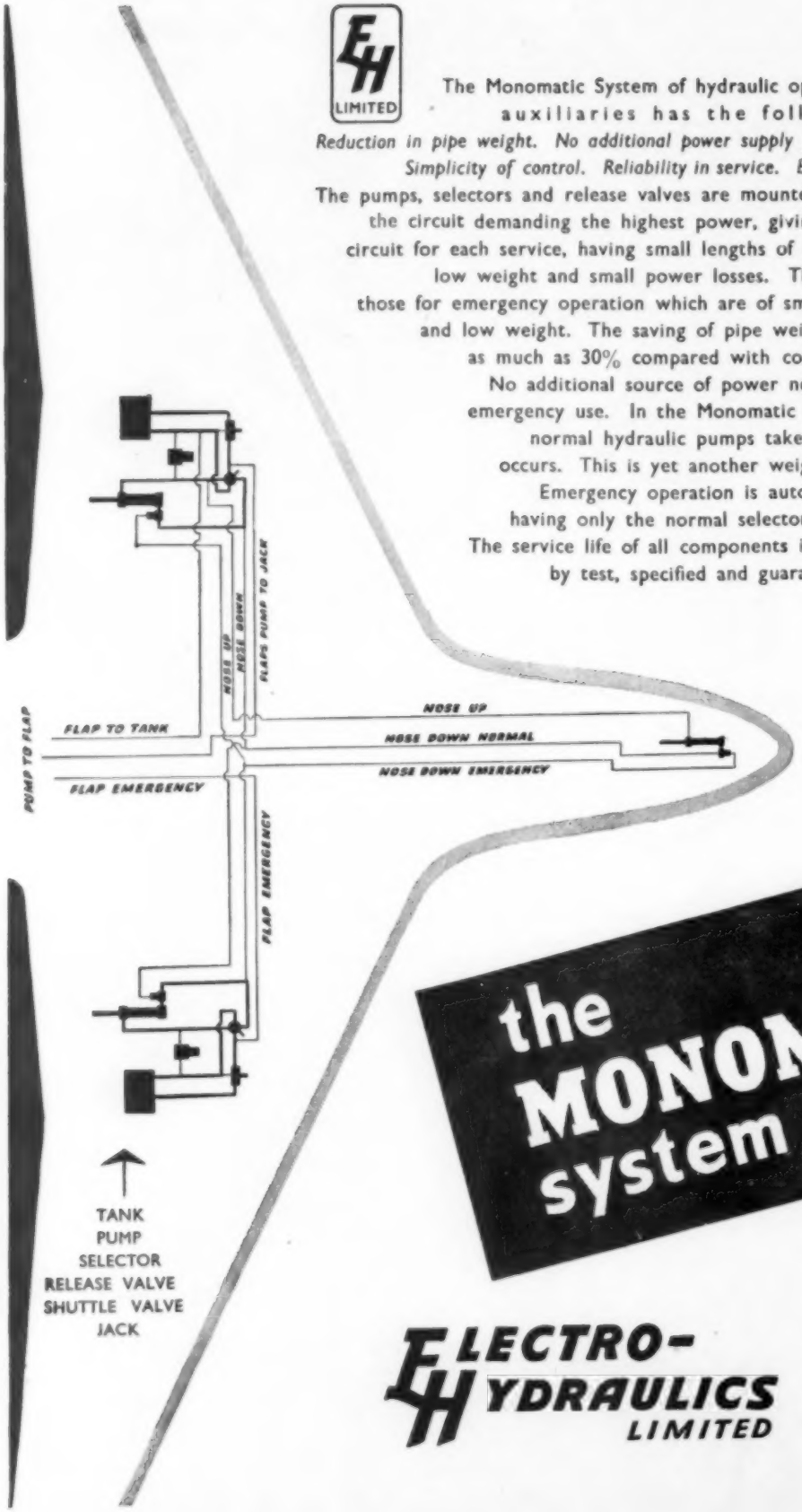

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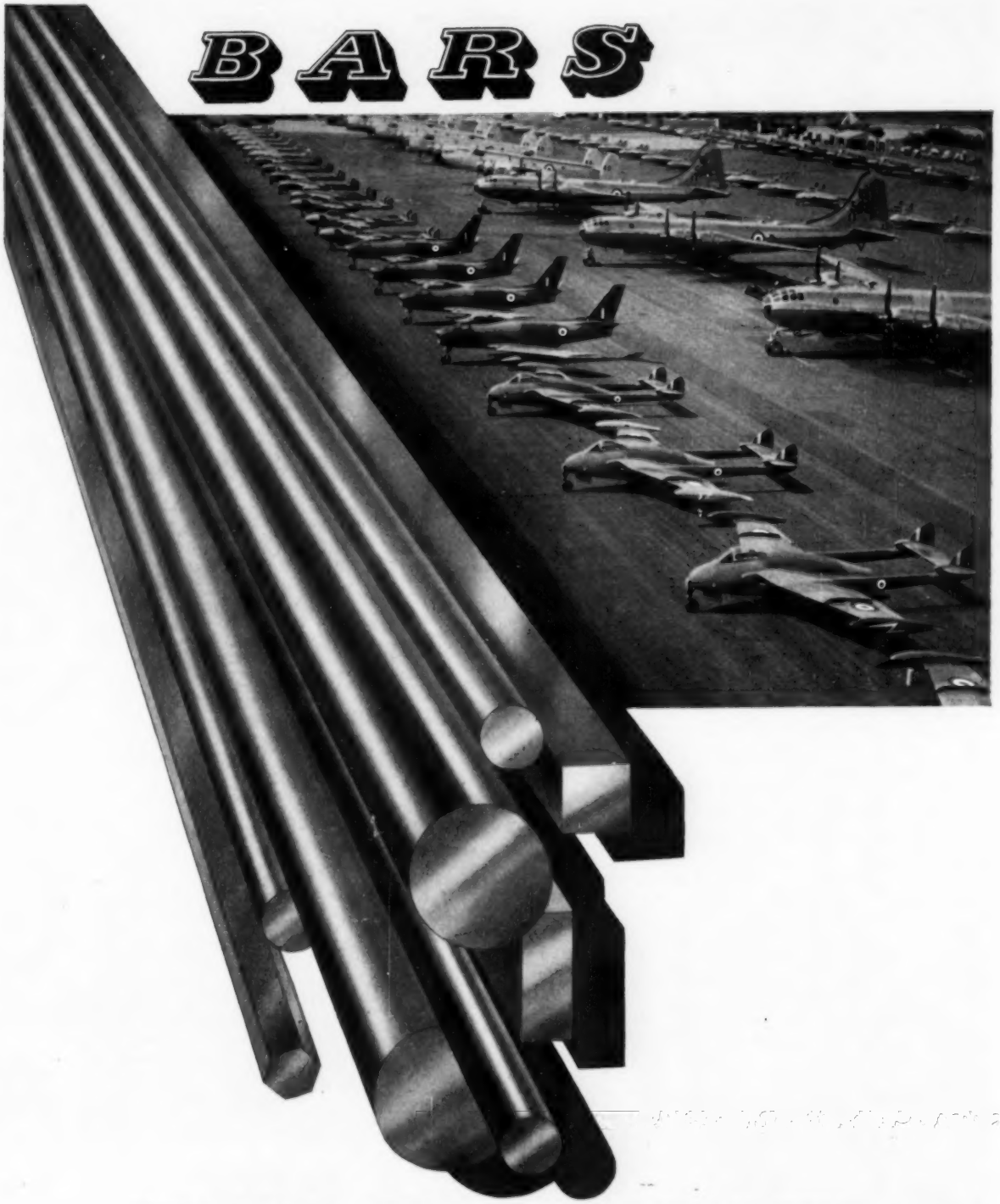

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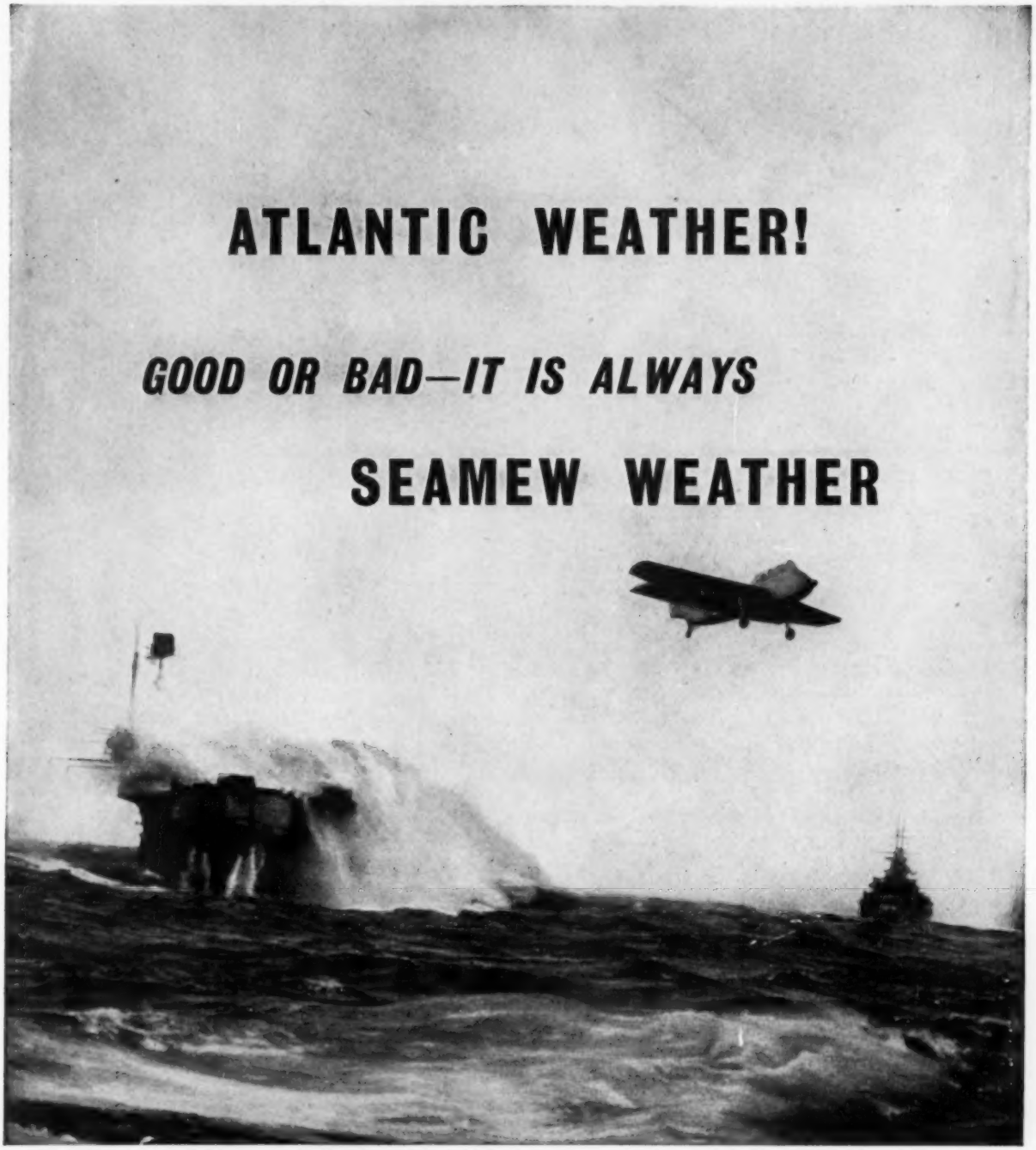

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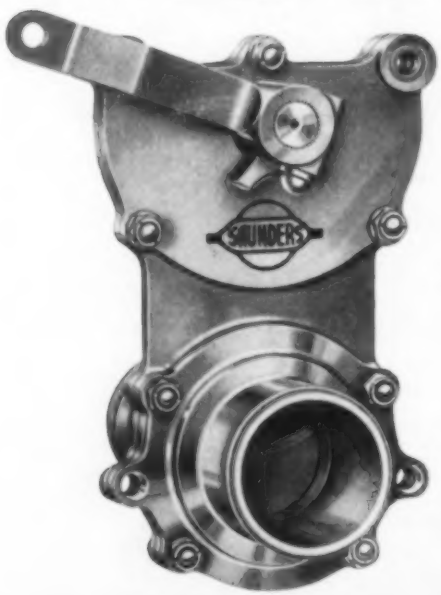

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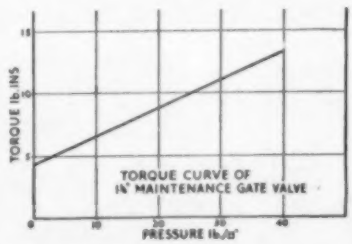

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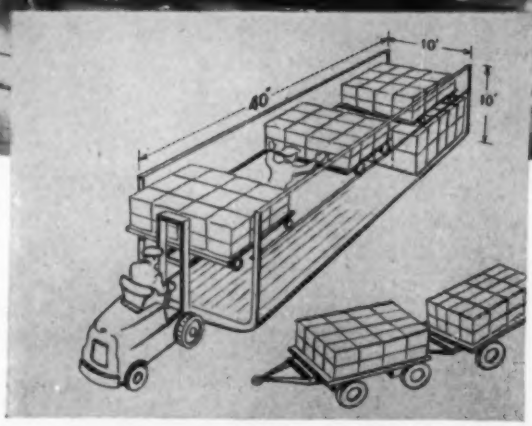

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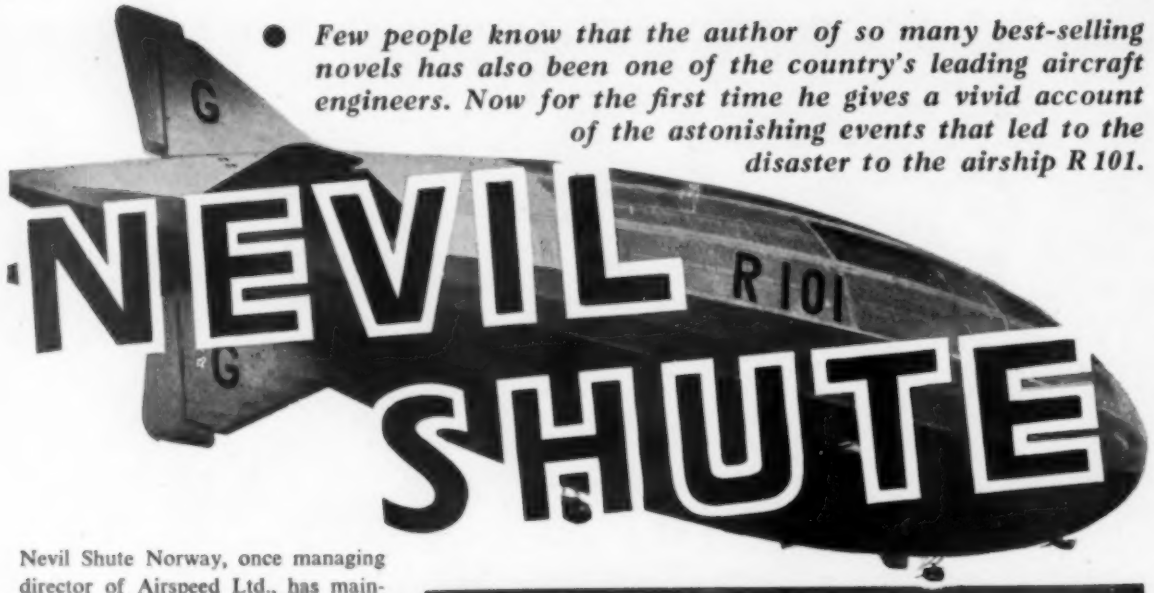

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SUNDAY GRAPHIC

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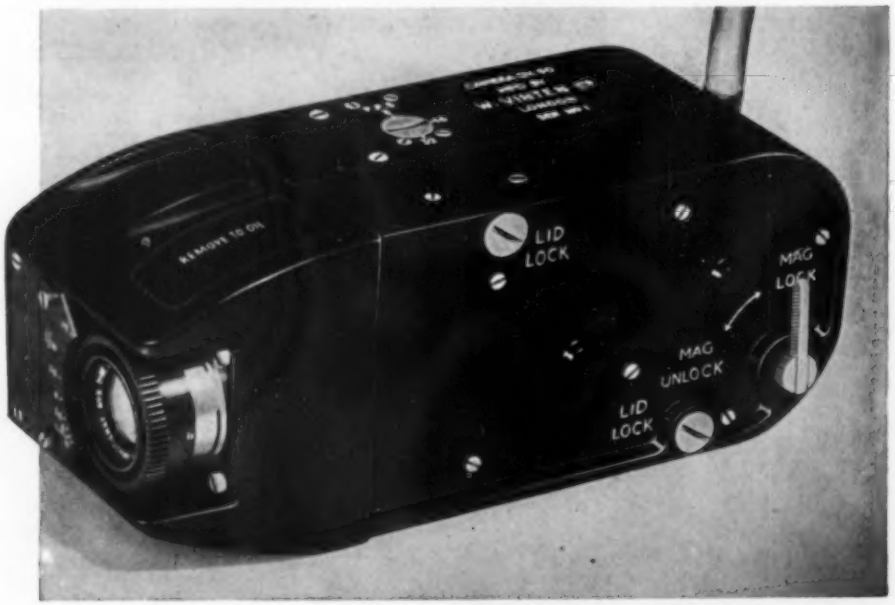

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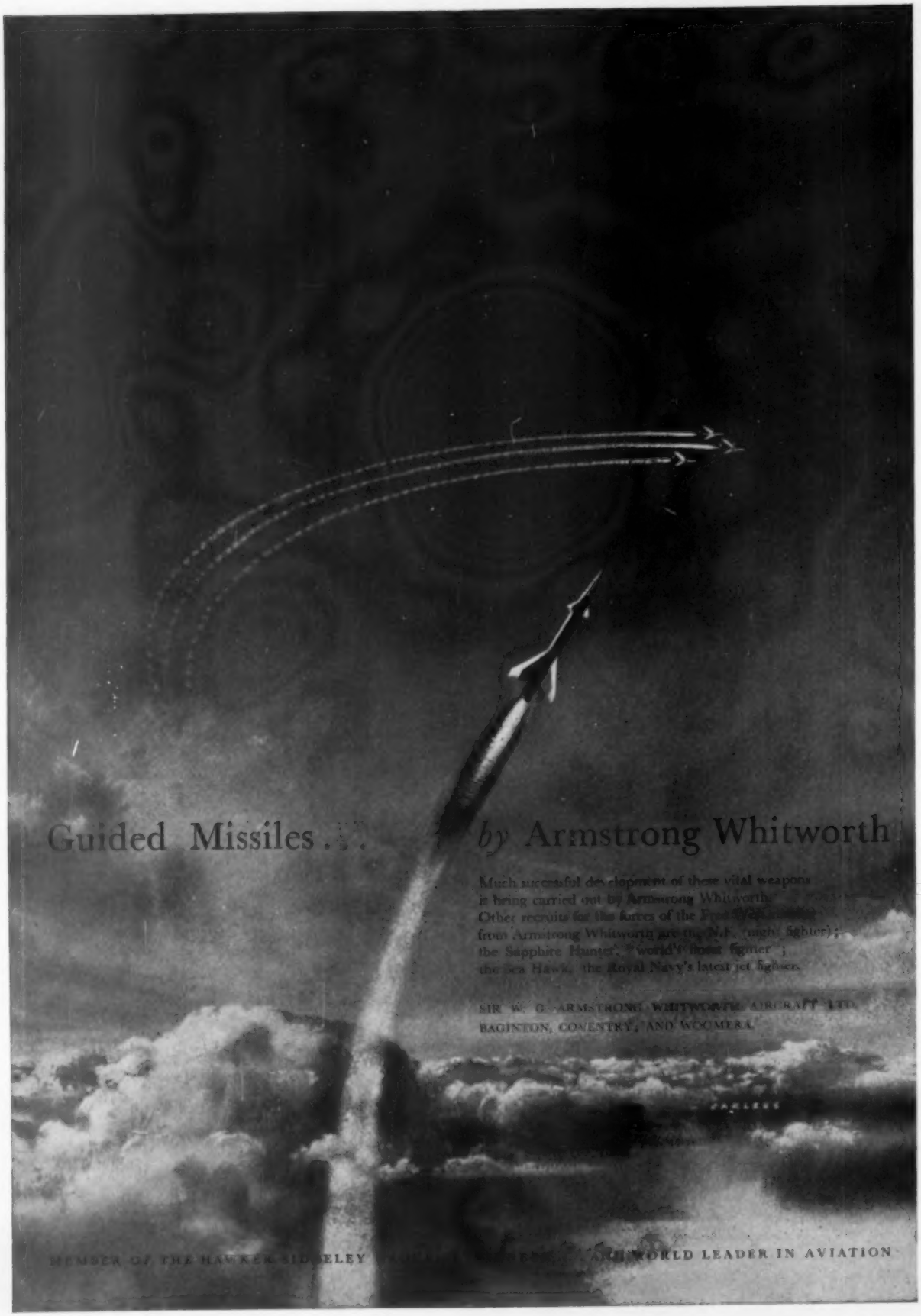
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Airfield Network

IT is difficult enough these days to get individuals or organizations to accept responsibilities which are unquestionably a part of their jobs; and it is harder still to persuade them to take on additional work in support of a worthy cause, or out of the goodness of their hearts. The maintenance of good secondary civil airfields—for use today, but more particularly in readiness for the great expansion of internal air travel and transport which will undoubtedly come—is a national responsibility; but exactly *whose* responsibility it is difficult to decide.

Unfortunately, such commitments often involve expense, and so far as the Air Ministry and the Ministries of Transport and Civil Aviation (and perhaps even of Education) are concerned, there is simply no more money forthcoming for private flying or the maintenance of civil airfields. In general, the aircraft manufacturers are doing very well, but the overall economy of aviation is stretched at many points. Thus, while almost everyone is prepared to express a genuine belief in the future and national importance of all branches of flying and of the facilities which go with it, relatively few do, or even can do, anything to further the cause.

Yet shortcomings in any single branch of aviation constitute a weakness in the whole structure. The present very disturbing situation in the recruitment of aircrews for the R.A.F. comes at a time when recreational flying is in low water. Knowledgeable people have drawn attention to this unbalance in the aviation picture, and have suggested a connection between the two aspects. To judge by accepted standards, such as the number of licensed pilots and the number of light aircraft registered per head of population, this country is unfortunately not high on the list for airmindedness. Nor does the variety of types or figures for deliveries of new light aircraft for home use indicate any widespread enthusiasm.

Guests at the annual dinner of the Aerodrome Owners' Association last week were probably left with such thoughts, among others, after listening to the addresses of several eminent speakers. A brief report of their observations is given on page 278.

The depressing circumstances soon to culminate in the closing of the remaining Reserve Flying Schools—and thus in the withdrawal of important support from the airfields concerned—may give way in a few years' time to a much more hopeful situation. Therefore the problem to be faced by any organization concerned with local flying and the management of a small airfield is basically one of remaining a going concern for a few very difficult years. The most likely way to succeed, probably, is to seek a little help from a number of sources and authorities. Many owners have already branched out beyond the aviation field in an attempt to keep profitably busy and to utilize their facilities, upon which flying makes only a part-time call. That conditions will improve within five years or so is probable, if only because of the inevitable expansion of civil aviation and the development of new civil aircraft.

We agree with one speaker at the A.O.A. dinner—G/C. Wilcock—that it will not be long before the city which lacks an airfield will be handicapped and regarded as behind the times. The congestion of roads has already reached a point where the convenience, speed and safety of vehicles has been considerably impaired, and there is little doubt that conditions will deteriorate further. Unfortunate as this situation is, it must eventually react favourably upon private and business flying and may hasten the use of Britain's air roads for the carriage of perishable goods, urgently required materials, and so on.

Naturally, helicopters figure largely in any discussions of the future of domestic flying. Both commercial and private rotating-wing aircraft, even though they may often use city-centre heliports, will, like buses and trams, require nearby bases—small airfields with hangars for garaging, and facilities for maintenance, refuelling and emergency landings. These they can share with fixed-wing machines of all kinds.

We have no hesitation in saying that all well-sited civil airfields and their buildings are national and local amenities of real value. Their continuation in operation now, if only at tick-over speed, is everyone's responsibility. These airfields, and more which will have to be built near cities and towns (the longer that local authorities delay the more difficult will be the siting and the more expensive the building and equipping of their airfields) will one day become as much a part of every community as the railway and bus stations.

AT THE CONTRACTORS' DINNER: A. Cdre. A. H. Wheeler, O.B.E., commanding Boscombe Down, greets Mr. A. R. W. Low, C.B.E., D.S.O., M.P., Parliamentary Secretary, Ministry of Supply. Between them is Air Chief Marshal Sir John Baker, K.C.B., M.C., D.F.C., Controller of Aircraft; on the left, Mr. E. C. Bowyer, director-general of the S.B.A.C. Just entering the door, past Mr. Bowyer, is W/C. Roland Beamont, D.S.O., D.F.C. Summaries of the speeches: p. 278.

FROM ALL QUARTERS

Speeding Aircraft Production: New Plans Announced

IMPORTANT new measures calculated to shorten the time required for the development of new types of Service aircraft were announced in the House of Commons last Monday by Mr. Duncan Sandys, the Minister of Supply.

Replying to a question from Mr. Charles Ian Orr-Ewing (Con., Hendon North), Mr. Sandys said that with the co-operation of the Secretary of State for Air and the First Lord of the Admiralty he had in the last few months been examining various schemes.

It would obviously be unwise to try to hurry the creative design-work, but he had come to the conclusion that there were a number of directions in which the administrative procedure could be further streamlined. For example, he believed a quicker start could be made on a new project if the aircraft firms were brought more fully into the picture in the early formative stage. Then, again, time could undoubtedly be saved if expenditure on production drawings and tooling were authorized somewhat earlier. He was consulting the industry on these and other proposals.

The Government had also been considering whether anything could be done to reduce the extensive period of flying trials. In view of the major technical advances usually embodied in new aircraft, the trials programme was necessarily long and exacting. Not only had flying qualities to be tested but also complex electronic equipment. In addition, firing or bomb-dropping trials had to be carried out. These numerous tests invariably revealed weaknesses and defects, some of which might necessitate re-design of major components. Such trials, including the introduction of modifications, were at present taking up to three years.

Some of the time was taken up by avoidable delays. It had not been uncommon for progress to be held up because a prototype aircraft, of which there were usually only one or two in existence, had been grounded for modifications, or had crashed. In order to reduce delays of this kind it was intended, in appropriate cases, to order sufficient development aircraft to allow more trials and modifications to be carried out concurrently, and to enable aircraft involved in accidents to be rapidly replaced.

Accordingly, in the case of the first supersonic fighter now being developed for the Royal Air Force, his department had ordered twenty additional aircraft for development trials apart from the usual prototypes.

The speeding-up of the flying trials would have the further advantage of bringing to light much sooner any defects and weaknesses there might be in the design or materials. This should result in reducing the amount of work required on retrospective modifications, which not only disorganized the production line, but added greatly to the cost.

Mr. Sandys was confident that, taken together, the various changes outlined would appreciably shorten the time required to develop new aircraft and that the increased expenditure in the development stage thereby involved would largely be offset by makers' savings in production costs.

Mr. Orr-Ewing congratulated the Minister on the sensible steps but wondered how much time would be saved.

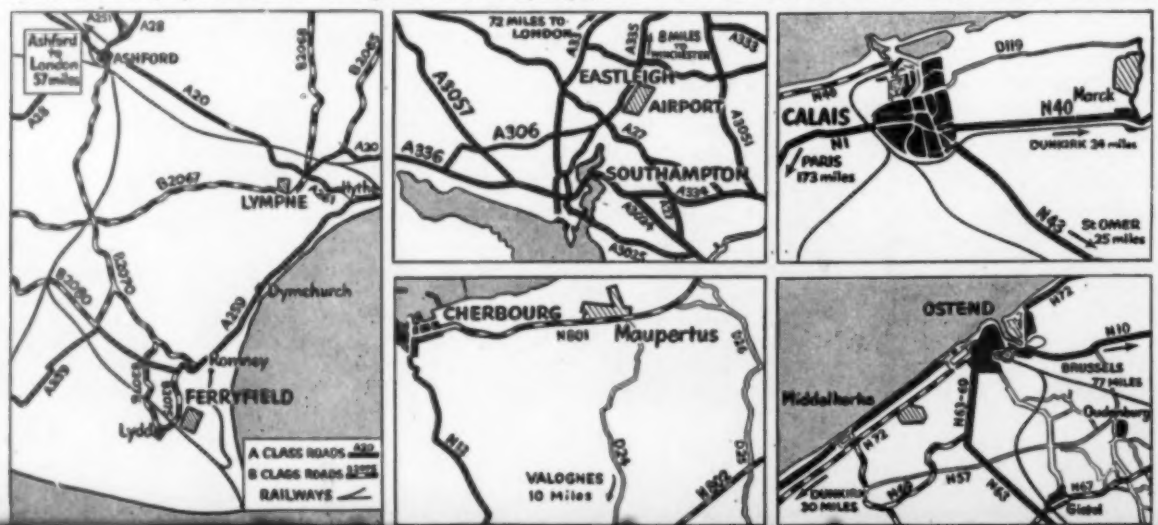
Mr. Sandys replied that it was difficult to be precise, but he would be disappointed if the measures did not result in getting new aircraft into service at least one year earlier.

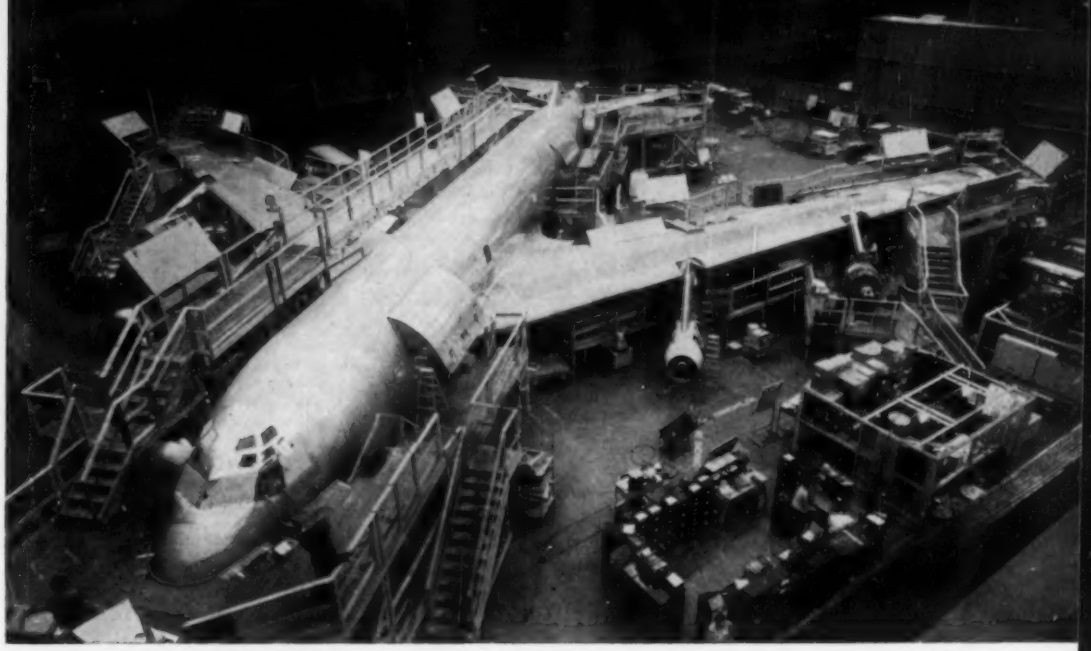
Flight is gratified to report the Minister's announcement, for many of the proposed measures are of a kind which this journal has advocated—in particular, in leading articles published on July 31st, 1953, and February 5th, 1954. The proposals present no startling novelty, and would probably have been made sooner had the Treasury been convinced that the ultimate gain would offset the initial extra cost.

Aeroflot Executive's Tour

THE head of the Soviet airline Aeroflot, Marshal Zhavoronkov, was reported to have said on Monday that Russia was ready for "closer civil air ties with the West." The marshal was speaking in Stockholm, where, as the guest of S.A.S. (with whom Aeroflot have an interline agreement), he was beginning a two-day study of Swedish civil aviation. Later he was due to continue to Copenhagen, Paris and Zurich.

AIR-FERRY GUIDE: These maps of the locations of the airfields used by Silver City Airways—including Ferryfield, to be opened this summer—are included in the company's new ticket-books. A great advance on anything of the kind hitherto seen, the books are, in effect, miniature travel-guides.





BOEING'S BIG HOPE : Suggesting a pike waiting to dart from the reeds, the prototype Boeing 707 (see below) lies in its extensive wooden scaffolding, surrounded by test gear, progress charts, filing cabinets, and all the paraphernalia of any "keep-out" experimental section. This particular prototype is an adaptable demonstrator which, although having a bias towards U.S.A.F. requirements, is intended to be able to show prospective airlines what a civil 707 would be able to do.

Delta Test-pilot

NOW recruited to the Avro test-pilot staff at Woodford, specifically for delta-flying, is S/L. J. G. Harrison, A.F.C., who has flown more than 60 types of aircraft ranging from Tiger Moths to deltas. James Gordon Harrison, who is now 36 years of age, joined the R.A.F. in 1935 and was commissioned in 1942. Thereafter he served with No. 605 Squadron and was subsequently on the H.Q. staff of 64 Group. In 1949 he was at the Empire Test Pilots' School, where he was runner-up to that year's winner of the McKenna Trophy (who, for the first time, was a non-British pilot, Lt. Cdr. Joe Smith of the U.S. Navy); at the prize presentation, the Commandant said of Harrison: "If ever a man deserved the runner-up prize, he did; he was only beaten by a short head—he put up a good show." Before leaving the Service, S/L. Harrison completed a Staff College course.

S/L. J. G. Harrison.

The Barnwell Lecture at Bristol

THE 25th anniversary of the formation of the Bristol branch of the Royal Aeronautical Society was due to be marked last night (Thursday) by the presentation of the first Barnwell Memorial lecture by Major G. P. Bulman, C.B.E., B.Sc., F.R.Ae.S. Major Bulman's paper was devoted to an account of the life and work of Captain Frank Barnwell, who, as chief designer to the Bristol Aeroplane Company, delivered the first lecture to the branch on February 28th, 1929. The renowned Bristol Fighter and the Blenheim were two of his designs.

Sir Raymond Quilter Joins Folland Board

AS from Wednesday of last week, Sir Raymond Quilter, Bt., becomes a member of the Board of Folland Aircraft, Ltd. Sir Raymond has had a long association with the aircraft industry, in which he is well known as chairman and managing director of the G.Q. Parachute Co., Ltd. He started flying, as a private owner, 26 years ago, and soon afterwards became interested in the design and use of parachutes; subsequently he made many descents, including delayed-action jumps. During the war he was chairman of the Parachute Panel of the Airborne Forces Committee.

Boeing 707 Revealed

FOLLOWING the extensive reports published in our issues of August 7th and December 11th and 25th last year, we can now present the first actual photograph to be released by the Boeing Airplane Company of the prototype 707 as it nears completion at Renton, Washington. Appearances are, of course, deceptive; there is much work still to be done to this impressive aircraft, and the first-flight date is scheduled for about June or July. But there are a number of points worth noting.

The four Pratt and Whitney JT3L (civil J57) turbojets are already installed, in their single, very widely spaced pods. These engines are designed to give 11,000 lb maximum thrust, this being the sea-level wet rating. The 130ft wing, which is swept 35 deg at the quarter-chord line, appears small in comparison with the huge 128ft fuselage. Tankage is contained within the highly stressed inter-spar structure; the rest of the wing consists largely of (a) a hinged leading-edge covering control runs, cables and piping, and (b) the rear portion, which includes the four large flaps, two-section ailerons (only the outer sections of which are used at high indicated air-speeds) and four two-piece spoilers on the upper surface. The four-wheel main bogies are hinged to the inner rear spar, and retract inwards to lie in the fuselage, where they are covered by large doors hinged on the ventral centre-line.

The fuselage is pressurized to 9 lb/sq in on both upper and lower decks. The wing passes through the lower deck, which is used only for cargo and equipment. The upper deck is fitted for use in various rôles, but five or six-abreast seating for 80 to 150 passengers can be installed. Windows are few, but a point of great interest is the provision of large, *outward-opening* freight doors. These doors embody very small rectangular windows, whereas the few windows in the fuselage shell are ellipses with the longer axis horizontal (*à la* Comet 3). The cockpit fenestration consists of six large panes, with smaller windows in the roof.

The tail is quite conventional, except that the fin folds to starboard as on the Stratocruiser. The quality of skinning on the 707 appears to be high. A dielectric nosecap betrays the presence of a scanner, probably an APS-42 cloud/collision warning set.

Boeing state that the 707—which at 190,000 lb all-up is of about the same weight as the less-powerful B-47 Stratojet but much lighter than the 350,000 lb, twice-as-powerful B-52—is designed for use in a variety of service and airline rôles. As a military tanker it could "refuel present and future bombers, fighters and reconnaissance planes," and also provide global logistic transport. As an airliner, it would make possible—in theory, if not in practice—trans-American schedules of five hours, and transatlantic services of seven hours eastbound. The prototype, which is a military/civil demonstrator, represents a private investment by Boeing of some $15m.

NOT TO BE MISSED

NEXT WEEK—on Friday, March 12th—the special "Helicopters of the World" number of *Flight* will be published. Very fully illustrated, it will cover all current types of rotorplanes and their power units. In addition, our usual regular features will be included. Last year's Helicopter Number was quickly sold out, so to make certain of securing their copies of next week's issue readers should place orders with their newsagents now.

SAFETY in the AIR

Sir Vernon Brown's Lecture before the Royal Society of Arts

A. Cdre. Sir Vernon Brown, C.B., O.B.E., was Chief Inspector of Accidents at Air Ministry from 1937 to 1946, and at M.C.A. from 1946 until 1952.

THE second of three Cantor lectures, concerning safety in transport, was given before members of the Royal Society of Arts in London on Monday last. It dealt with air safety and was given by A. Cdre. Sir Vernon Brown, C.B., O.B.E. (retd.), late Chief Inspector of Accidents, Ministry of Civil Aviation. There follows an abridged version of the paper, which was entitled *Safety in the Air*.

After tracing the history of flying up to the Wright brothers' flight in 1903, A. Cdre. Brown pointed out that, although the advent of the aeroplane had been thousands of years behind the ship, it was only about 80 years behind the steamship, about 70 behind the railway engine and only ten behind the motor car. The obvious and all-important difference between flying and other forms of transport was that it was three-dimensional, and where safety was concerned this was very important.

During the last war, the speaker continued, the United States went far ahead of Britain in the development of transport aircraft, so that in 1946 this country had to convert its war material for civil use. Moreover, at that time a great number of small charter companies sprang up in addition to the three Corporations. Whatever the causes, it was regrettably true that, in the first year or two after the war, there were too many accidents in this country. The available statistics had compared very unfavourably with the state of affairs in the western hemisphere, but since then our standards had been tightened up, and the hours and miles flown had increased enormously. As a result, there were far fewer accidents per passenger mile flown by British scheduled and charter companies at present than ever before.

A modern aircraft must fly at high speed and carry big loads in any part of the world by day and night, and in almost any weather conditions, and it must fulfil these requirements with safety, regularity and comfort. Of these, safety had priority of place. The most important factors in the achievement of air safety seemed to be airworthiness; crashworthiness; airline operation; maintenance and inspection; accident investigation; the exchange of information between Government departments, designers, manufacturers and operators; statistics; and publicity.

Airworthiness.—This term embraced the many requirements which went towards making an aircraft as safe to fly as possible, having regard to the available knowledge. Broadly speaking, these requirements covered design, construction and performance. The speed at which aeronautics had progressed made one wonder whether designers ought not to take a short rest now to give their staffs a chance to catch up with them.

In the design of a transport aircraft, consideration had to be given to overall weight, safety factors, speed, range and payload, structure weight, landing gear strength and taxying loads, strength to withstand gusty conditions, flap mechanisms, powered controls, cabin pressurization, ventilation and heating, the performance requirements for take-off, landing and ditching, and the thousand and one pieces of equipment which went to make up the complex whole. To that formidable list must be added the power plant and engine accessories, the instrumentation and radio equipment.

Obviously, standards must be set and maintained, and it was the Air Registration Board which dealt with such matters. This organization, set up by Parliament to advise and assist the Minister responsible for civil aviation in technical matters, stipulated the requirements of the civil code and watched over a civil aircraft from the drawing board stage until it passed into service. It was often said that regulations were unnecessary, but in dealing with so complicated a subject as aviation they were essential. The success of the Board in laying down and maintaining standards of airworthiness was shown in the statistics; accidents due to faulty design or construction formed a very low percentage.

"Crashworthiness."—This referred to the provision of protection for an aircraft's occupants in a crash. A lot could be done to save people from death or injury in the lesser kind of accident, i.e., over- and under-shooting, belly landings, ditching, and the low-speed survivable kind of crash, perhaps accompanied by fire. Although means of preventing fires and of detecting and extinguishing them if they did occur were the subject of continuous research and development, a crash which might involve the destruction on impact of an aircraft's fuel tanks, and might release thousands of gallons of highly inflammable fuel near red-hot exhausts or jet-pipes, was a very difficult problem to overcome. It did appear that, whatever kind of fuel tank was used, it should be capable of withstanding high impact loads, should not be placed in particularly vulnerable positions, and ought to be as far away as possible from known sources of ignition.

The controversial question of backward-facing seats was also important. There was ample evidence that head injuries were the most frequent causes of death or serious injury in crash landings. Obviously, the extent and nature of injury must depend on whether the seat and safety belt remained intact, and on the extent of damage to the aircraft itself. In a straight crash, one's body would be projected into whatever lay ahead, and unless seat and belt held, serious injury might result. It was the lecturer's opinion that, if seats were constructed to withstand at least 20g, and if in addition they faced backwards and were provided with adequate head, back and leg protection, the mortality-cum-injury figure would, in the case of survivable accidents, be reduced to an almost negligible quantity.

If it should prove necessary to alight in the sea, it was important that an aircraft should float for sufficient time to allow the evacuation of its occupants into boats or dinghies which would have a good chance of survival. Therefore the aircraft should have good ditching qualities, the exits should be adequate and the passengers should be well briefed on the evacuation drill, which itself should be simple.

The question of emergency exits was obviously just as important for ground as for sea evacuation. An exit was of no use if it could not easily be opened, if it were too small for a passenger of abnormal build, or if, on getting out, one had to drop 20ft—or even 10ft—on to hard ground or into the sea, with a good chance of breaking a limb in the former case, or being lost in the latter. A standard method of opening for emergency exits, also, seemed an important and necessary step.

Airline Operation.—This was a very wide subject, but briefly the procedure was that an operating company must first, of course, obtain M.T.C.A. permission to operate and would naturally only buy approved aircraft of the kind wanted for its particular purpose. It must have its pilots, navigators, engineers and radio operators as well as ground staff, and all these people would be properly qualified as required by regulations. Before a flight took place, weather information for the route must be obtained, the aircraft loaded and its weight and centre of gravity position computed. Finally, the flight plan was prepared and the radio and navigational aids for the route were studied as well as landing facilities at any intended port of call. These were the most important points; should it appear to the Ministry that an operator was not functioning as a responsible organization ought, its permit might be withdrawn.

Maintenance and Inspection.—Except for the annual renewal of the Certificate of Airworthiness, a periodical examination of a privately-owned aircraft by a licensed engineer was not mandatory. But approved maintenance schedules must be adhered to, in respect of any aircraft plying for hire or reward. This meant that they must be properly maintained by qualified engineers, who were examined and licensed by the Air Registration Board on behalf of the M.T.C.A.

Accident Investigation.—Without knowing why an accident or incident occurred, no steps could be taken to prevent a recurrence. Therefore, there should be a careful investigation of every untoward event. It was this accepted view that, in 1920, had led to the establishment in this country of an Accident Investigation Branch. Apart from any enquiries such an organization might carry out for the fighting Services, its main function was to investigate civil flying accidents, in order to make it possible for the Minister to carry out his responsibility to Parliament and so to the public.

In investigating an accident, the question of pilot fatigue might be significant, and for any particular class of aircraft, one might have to consider the possibility of psychological causes associated with cockpit ventilation, noise, vibration, temperature, lack of sleep, alcohol poisoning, colds, domestic worry, etc., any of which might affect the pilot's responses to audible and visible warnings.

Students of human engineering might well be able to help by determining the limits to which an individual could be expected to go in an emergency, in making use of what the designer had given him. It had recently been suggested that designers must not assume that the pilot was always at peak efficiency. But accidents could be caused by weather conditions, faulty design, mistakes in construction, or bad maintenance, in addition to the breakdown of the human element.

An aircraft might encounter storms, sometimes accompanied by turbulence giving rise to severe buffeting, and might also meet with conditions of rain, hail, icing, snow or fog. It might also be struck by lightning. This gave a frightening picture, but although accidents had been caused by loss of control in some of the conditions just mentioned, the speaker knew of no case of a fatal lightning strike. Glazed ice was rare, and early warning of such phenomena was usually given. If fog existed such that visibility was reduced below the operator's minima, a diversion was always offered or advice given to a pilot to return to base before his "point of no return" was reached.

The lecturer next showed a comprehensive selection of photographs illustrating cases where careful and systematic examination of parts of crashed aircraft had indicated the type of material failure and so the cause of the accident. From the pictures, he said, the importance of careful wreckage examination—not only on the spot, but if necessary later in the laboratory—could be seen. That was why the Inspectorate of Aircraft Accidents insisted that the wreckage of a crashed aircraft should be left intact until an opportunity had been afforded for expert examination.

Exchange of Information among Government departments, Manufacturers and Operators.—This was a very important factor and could be divided into two categories. (1) The reporting of every accident and incident, and the passing on of the report, although it might seem to be only of local interest, and (2) the dissemination of technical information.

It was important that, if safety were concerned, vital information obtained by one organization should be made available generally. It was easy to understand reticence on the part of a designer or operator, where commercial rivalry was concerned, but if people's lives were in danger it could be an almost criminal act to keep it "under the hat" for purely personal reasons. During the war, in the common interest, it was agreed that knowledge of this kind should be pooled, and the continuation of co-ordinated knowledge between the Ministries, fighting Services, designers and operators was still needed.

Statistics.—Another important aid to safety was the compilation and analysis of statistics. But statistics must be accurate and not based on numbers which were too small to be realistic. Generally, numbers of accidents or of fatalities were related to revenue passenger-miles, or to revenue aircraft-miles. Thus, one learnt that in the United Kingdom in 1950 the passenger miles flown per passenger killed were 16,198,500, which meant that 23,600 miles were flown per passenger killed. This could be expressed as 0.045 fatal accidents per million aircraft miles, or it could be said that 6.8 passengers were killed per 100 million passenger miles. Again, it could be shown that the number of stage flights per fatal accident was 61,300. The speaker personally thought that the most realistic picture was that 22,395,000 aircraft miles were flown per fatal accident.

There were so many variables that no comparison between the various forms of land, sea and air transport with respect to safety seemed possible. The accident rate trend, however, was certainly encouraging.

Publicity.—In so far as publicity might serve to keep designers, manufacturers and operators on their toes, it could serve a useful purpose, but the aircraft often seemed to be at a disadvantage compared with other forms of transport. A distorted picture of airline safety was likely to shake public confidence, and the speaker suggested that the too well illustrated front-page news of an aircraft accident sometimes resulted in a disservice to aviation in general and to British civil aviation in particular.

A. Cdre. Brown concluded "I have spoken about accidents caused by failure of the human element and of those due to weather, defective materials and poor maintenance. I have referred to airworthiness, crashworthiness and to airline operation, statistics and publicity. But you will want to know what is being done to overcome the hazards of flying.

"The Ministry of Transport and Civil Aviation has a permanent representative at I.C.A.O. in Montreal who watches over the United Kingdom's interests in the international field of civil aviation, particularly when standards and recommended practices are discussed. At home it has the help and advice of the Air Registration Board. Arising out of I.C.A.O. representation and the activities of the A.R.B. and from considerations of accident reports, the Ministry from time to time makes such regulations as seem necessary towards safer flying.

"There is a close liaison between the ministries in order that valuable information obtained from the experience of the fighting Services and civil aviation shall be pooled, so far, of course, as security makes this possible. This data is made available to the Society of British Aircraft Constructors who can pass it on to the designers and manufacturers. What is perhaps even more important is that the experimental establishments, and particularly the Royal Aircraft Establishment at Farnborough, are available to everybody for advice and guidance. Airworthiness is of a high order and crashworthiness is given its relative importance, and in respect of our pilots, our crew and our ground staffs, our operational and maintenance engineering staffs, our meteorological services and those concerned with air traffic control and the operation of navigational aids, I doubt if their training and their overall efficiency can be bettered in any other country.

"Moreover, our two airline corporations have their own safety committees, whose duty is to investigate thoroughly every incident and accident which happens in their organizations.

"All this is surely very encouraging and to end, can I give greater assurance than to say that, in spite of what I know as the result of 15 years' work connected with the unfortunate side of aviation, I still use the aeroplane as a means of transport when it is convenient to do so!"

THE NAVY AND ARMY ESTIMATES

LAST week we dealt at some length with the *Statement on Defence* and with the Memorandum on the Air Estimates. Certain information of general interest to *Flight* readers, arising from the Navy and Army Estimates and their accompanying Memoranda, can now be added.

The Navy. Aircraft carriers, about which so much has been said and written during the last year, and which are now regarded as the capital ships of the Navy, comprise the most important items in the building programme. Eleven carriers are at present in commission, and during the coming year three more should be completed—*Ark Royal*, 36,800-ton sister ship to the *Eagle*, and *Centaur* and *Bulwark*, which are 20,000-ton carriers. All three will have the new angled deck and *Ark Royal* will also have a steam catapult. *Indefatigable* and *Implacable* are soon to be withdrawn, bringing the total of carriers in reserve to five. Two other 20,000-ton carriers, *Albion* and *Hermes*, are building.

The gross estimate for the Navy for 1954-55 is £403,300,000, which represents a net increase of £23½m by comparison with the previous year.

Aircraft are included under Section 3 (Contract Work) of Vote 8—Ship-building, Repairs and Maintenance, etc. The gross estimate for Section 3 is £100,957,000, for which there is an appropriation-in-aid of £23,095,000. This includes £14m granted as Mutual Defence Assistance.

A break-down of the estimate shows that hulls and machinery are expected to cost £50,386,000; armour, gun mountings and equipment £9,412,000; aircraft, including repairs, £24,628,000. The figure for aircraft in 1953-54 was £17,837,000.

Readers will be familiar with the recent introductions into service of new Naval jet fighters, in particular of Sea Hawks during the last few months. These represent a great advance over the earlier piston-engined types, but it has been noted in several quarters that the Navy are still a long way from receiving any swept-wing machines with performance equal to that of the latest aircraft in service with the American Navy.

The Army. The announcements regarding atomic weapons are of direct importance to all three Services. Officially it is stated that the War Office is nearing a decision on the introduction of an effective Army atomic offensive weapon. It will probably take the form of a medium-range guided missile in the ground-to-ground classification and handled by the Royal Artillery. The Secretary of State for War, Mr. Head, has stated that he doubts whether the stage had been reached when the introduction of atomic weapons could lead to significant savings of manpower.

Mr. Head also said, in his Commons statement, that an atomic missile seemed preferable to the atomic shell fired by a gun, since the explosion of a small shell was an uneconomical way of using limited supplies of fissile material. In answer to questions, Mr. Head stated that the prototype of the Army's guided weapon to which he had referred, already existed, but he was not prepared to say whether it was British.

Another announcement concerned provision of detection instruments—the term "radiac" was used to describe them. Their purpose was to detect radio-active after-effects of an atomic-bomb explosion, and troops were now training with them.

IMPORTED: Bearing U.S.A.F. markings, this Mig-15 was demonstrated by Capt. H. E. Collins at Wright Patterson A.F.B. last week.

HERE AND THERE

Canberras at Eniwetok

R.A.F. CANBERRAS are to be used for high-altitude atmosphere-research in the test area at Eniwetok Atoll, where the Americans are to explode a hydrogen bomb during the current test series.

Soviet Strength

IN a written reply, the Parliamentary Secretary to the Ministry of Defence, Mr. Nigel Birch, stated recently that the Soviet Air Force had about 20,000 aircraft; additionally, there were 3,000 naval aircraft.

Investigating Monopolies

THE PRESIDENT of the Board of Trade has appointed Mr. Brian Davidson, commercial director of the Bristol Aeroplane Co., Ltd., to be a part-time member of the Monopolies and Restrictive Practices Commission.

Service Pay Increases

IN an attempt to alleviate the serious position in the recruiting and re-engagement of technicians—referred to in the Air Estimates Memorandum last week — the Government were expected to announce considerable pay increases, for all three Services, in the Defence Debate last Tuesday. Rises ranging from 15s to 50s were rumoured in unofficial forecasts.

Senators Probe Off-shore Work

AFTER having visited Paris, Frankfurt and Rome, U.S. Senators Bridges (Republican) and Symington (Democrat) arrived in London last Sunday on a visit the purpose of which is stated to be an examination of off-shore production, particularly that of aircraft. The Senators are visiting Hawker factories to see production of off-shore Hunters; last Tuesday they were due to see a Dunsfold demonstration by Neville Duke. Both Senators are members of the Senate Armed Services Committee; Mr. Bridges is chairman of the Senate Appropriations Committee and Mr. Symington is a former Secretary for Air.

Handley Page Figures

A PRELIMINARY announcement of Handley Page trading results for last year shows that group profit, after deduction of all charges, including taxation, was £243,574 (1952, £189,938); taxation absorbed £403,831 (£370,915).

Kawasaki-Lockheed Tie-up

IT was announced in Tokyo on Monday that the Kawasaki Aircraft company had signed an agreement with Lockheed which permits the Japanese firm to manufacture the Lockheed T-33 jet trainer and F-94C all-weather Starfire fighter. Since early 1953 Kawasaki has, at its Gifu plant, carried out maintenance for the U.S.A.F., principally on the Lockheed F-80 Shooting Star and N.A. F-51 Mustang.

Brackley Trophy Winners

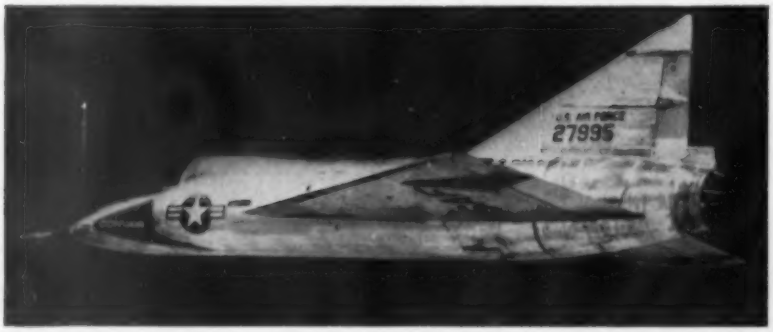
IN one of our photographs last week of personalities at the James V. Martin dinner the caption should have identified the right-hand figure as Capt. H. W. C. Alger, who is seconded from B.O.A.C. to Saunders-Roe, Ltd., for duties in connection with Princess flying-boats. Also portraying Mr. G. A. V. Tyson and Mr. J. Lankester Parker, the picture thus showed three of the four past winners of the Brackley Trophy; the fourth was Mr. Barry Aikman.

The Eastchurch Memorial

GOOD progress is being made with the plans for the Eastchurch Memorial to Pioneer Airmen, to be erected at Eastchurch in the Isle of Sheppey, which was the scene of so many pioneering experiments by British constructors and pilots, and of the birth of the R.N.A.S. The memorial, which is to take the form of a garden feature incorporating a Kentish ragstone wall, seats, and a statuary group, is the work of Mr. S. H. Loweth, F.R.I.B.A. (architect) and Mr. Hilary Stratton, F.R.I.B.S. (sculptor). There has been a generous response to appeals for subscriptions, but a little more is still required for the finishing touches which will make the memorial worthy of its object. Donations should be sent to the chairman of the organizing committee, W/C. W. E. James, Oak Lane, Minster-in-Sheppey, Kent.

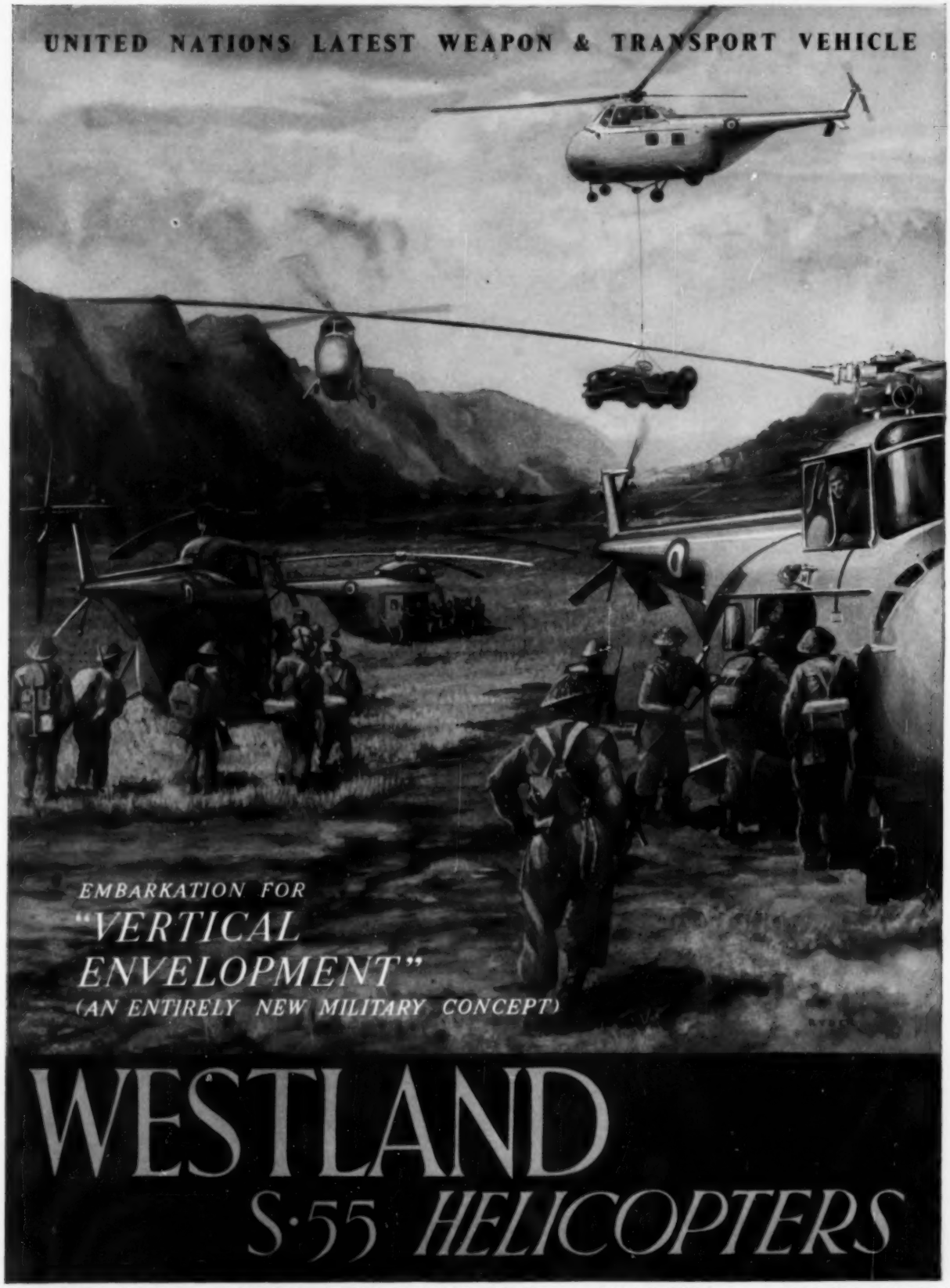
STEALING SOMEBODY'S THUNDER: Resisting the temptation to indulge in technical terms like "curves of pursuit," but otherwise without apology, we present this picture of film actress Marilyn Monroe talking to a Thunderjet pilot during her much publicized visit to Korea. They were "discussing combat operations."

MANNED MISSILE: As we closed for press we received this first photograph of the Convair YF-102, the Mach 2, delta-winged all-weather intercepter for the U.S.A.F. The world's most advanced fighter, its remarkable features will be discussed in an early issue.



For Greater Enjoyment

PHOTOGRAPHIC and motoring enthusiasts, respectively, are reminded that two of our associated journals will shortly be publishing special numbers. On March 10th *Amateur Photographer's* Outdoor Number (including a comprehensive review of exposure-meters, rangefinders and colour filters) will appear; and on March 12th *The Autocar* will publish its Spring and Touring Number, which will contain details of many items of equipment to assist the car owner in his summer excursions.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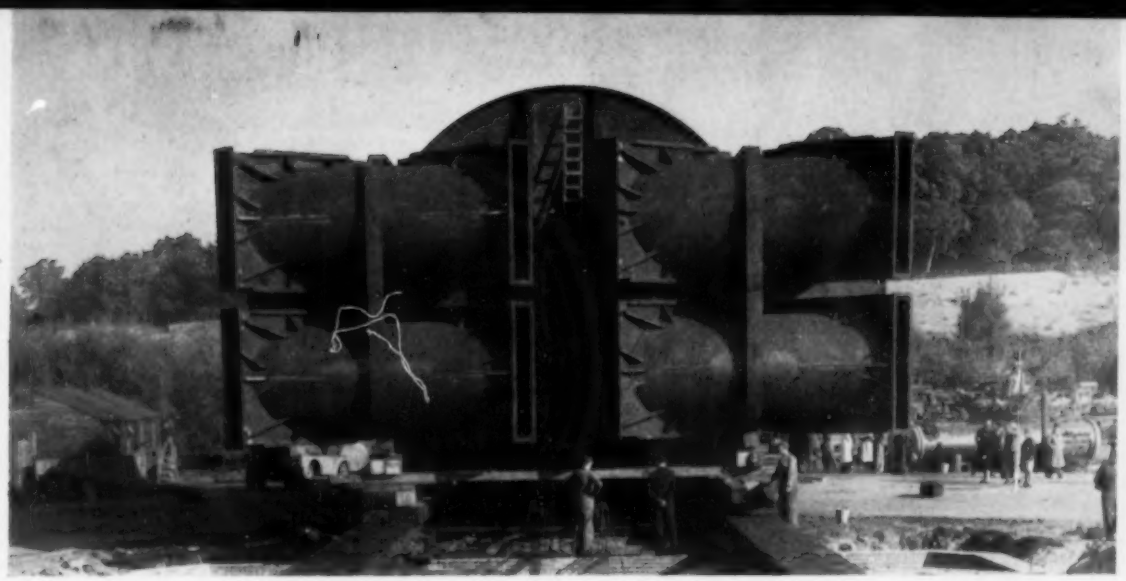


THE BIG FLASK

—at Weybridge: High-altitude Simulation for Vickers-Armstrongs Aircraft Research

IT was in 1947 that the improbable object shown above was launched along a ramp on to the site of the old car-racing club-house at Brooklands. "Launched" was the official term used to describe the operation, and it was apt, for this cylindrical monstrosity of welded steel had been constructed at the Vickers shipbuilding yards at Barrow, before being transported south in units and assembled before a startled Surrey countryside.

Diligent readers of *Flight* may recall that this occasion was the first public appearance of what was called the "stratosphere chamber" belonging to the aircraft division of Vickers-Armstrongs, Ltd. It is still called the "stratosphere chamber," and for several years now it has been doing good work for the company's research and development section. We journeyed to Weybridge recently to learn more about it.

Ready and willing to enlighten us there was Mr. N. W. Boorer, whose work has been connected with the chamber—not unexpectedly the largest of its type in the country—since the design stage. Dr. B. N. Wallis, head of research and development at Weybridge, was responsible for the original design, which was basically for a large cylinder in which conditions of low temperature, low pressure and low humidity could be maintained almost indefinitely. Its main object was to provide high-altitude simulation for the testing of aircraft components and equipment.

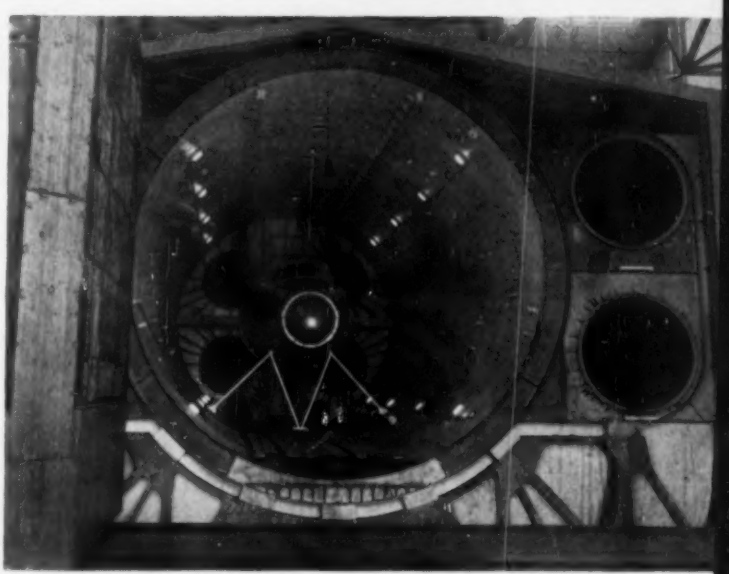
The working section of the test chamber is 50ft long and of 25ft diameter, construction being of ½-inch steel plates, with external stiffening rings spaced at intervals of 2ft. At each end of the cylinder are the four circular openings of the air circulation ducts, one pair of which passes externally along each side of the main chamber. The ducts are 6ft 9in in diameter, and are also stiffened by external rings, spaced at 16-inch intervals. The entire structure is enclosed in a steel-framed shed whose walls and roof carry a 12-inch layer of insulating material.

One entire end of the pressure-hull structure forms what is known as "the great door," which can be moved aside on its carriage to permit the installation and removal of large test-specimens. At the other end of the chamber are the two air-lock doors and compartments through which personnel enter, and also the vacuum-pipe aperture.

Further details were added by Mr. Boorer as we inspected the massive installation, which is housed in a separate building adjoining the research and development section. The refrigeration plant, which can cool the chamber air to −65 deg C, consists of four two-stage ammonia compressors (each driven by a 150 h.p. electric motor), the action of which cools a supply of methanol. This is circulated at the rate of 20,000 gallons per hour through a series of 16 sets of copper cooling vanes, which also function as turning vanes for the airflow, being situated at each corner of each air duct. The total surface area of the coolers is 20,000 sq ft, and the time taken to lower the chamber temperature from +15 to −65 deg C is approximately 30 hours. A typical performance figure is a heat extraction of 360,000 B.Th.U. per hour at −50 deg C.

The conditions of low pressure and density corresponding to high altitudes are effected by the use of a two-stage Nash Hytor

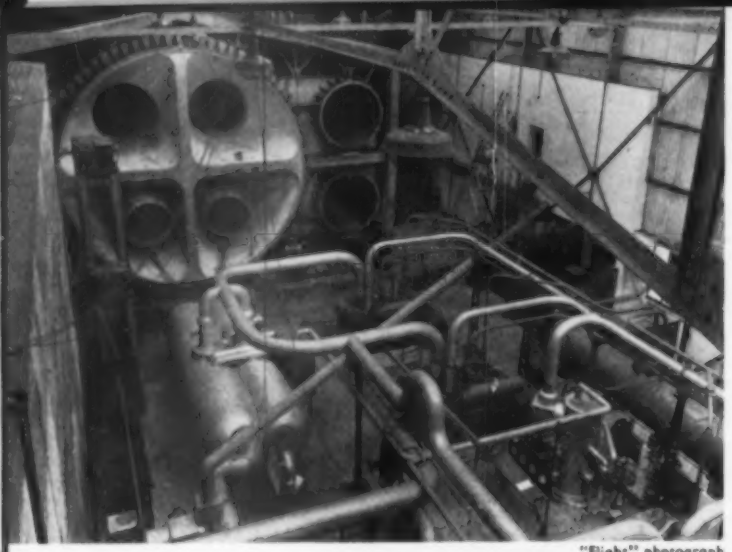
Associated with the work of the Vickers stratosphere chamber are Mr. N. W. Boorer (right) and Mr. T. V. Small, of the research and development section, pictured in the control room.



A view of the high-altitude test chamber with the "great door" open. The forward part of a Viscount fuselage is mounted in the working section, on the right of which are seen two of the air circulation ducts.

"Flight" photographs

THE BIG FLASK . . .



"Flight" photograph

(Top) The "great door" moved aside from the insulating shed, visible on the extreme left; the fan motors, and part of the refrigeration plant, can also be seen. (Centre) The testing of meteorological balloons, which included the simulation of solar radiation at height. (Bottom) The space below the main pressure shell, at the same temperature as the working section, is used for the testing of the Viscount tailplane at −60 deg C.

vacuum pump, driven by an electric motor of 140 h.p. This provides an equivalent initial rate of climb of 1,500ft/min with the chamber air at +15 deg C, and gives a maximum simulated height of 80,000ft (0.395 lb/sq in), or an initial climb of 1,000 ft/min with the air at −60 deg C, and a ceiling of 60,000ft (1.037 lb/sq in), or intermediate values. Emergency refilling of the chamber by opening a 12in valve in the vacuum pipe gives a descent from 50,000ft to sea level in 160 seconds.

To obviate icing in the chamber at low temperatures, due to moisture in the circulating air, an air-drying plant has been provided. This consists simply of a bed of silica gel, through which the air is passed before entering the chamber. The plant is of sufficient capacity to supply three charges (each of 30,000 cu ft) of dry air per 24 hours, this air having a frost point of about −40 deg C at sea level pressure and temperature. With expansion to simulated altitude this value is improved, actual air frost points recorded at an I.C.A.N. pressure equivalent to 35,000ft being of the order of −60 deg C. The rate of refilling the evacuated chamber with dry air is normally 360 cu ft/min. Plant engineer in charge of the refrigeration, vacuum and air-drying equipment is Mr. G. M. Stapleton.

Air circulation is by means of four-bladed fans, one in each duct, driven by variable-speed D.C. motors of 150 maximum h.p. Usual airflow speed during high-altitude tests is about 6 kt, with a normal maximum of 40 kt, or up to 60 kt with the use of special nozzles when such speeds are required.

The concrete floor of the insulating shed around the chamber is itself supported on brick piers about 8ft above the main concrete foundations. The chamber is supported on steel cradles, the mounting at the enclosed end being on rollers to allow for overall expansion or contraction effects. Differential expansion between the working section and the air circulation ducts is accommodated by flexible steel bellows situated midway along each duct and supported on independent pylons.

The opening of the "great door," which has its own insulation shell, is effected by means of a 40-ton hydraulic jack built into the door of the building. A detachable strut connects with the chamber door, which is drawn away 12in from the sealing face of the chamber structure. A hand-operated winch built into the carriage of the great door then enables a sideways movement of 45ft to be made.

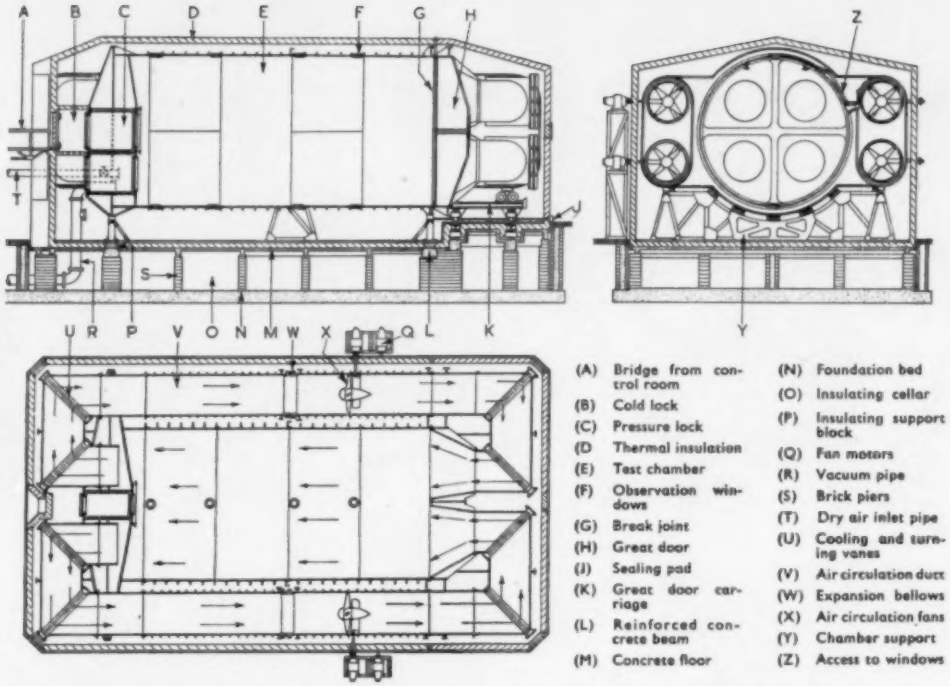
At the time of our visit, the forward part of a Viscount fuselage was attached to the mounting ring around the upper air-lock door. Moving out of the chamber through the lower air lock (both air-lock compartments can be used also as "sub-chambers" for testing small specimens under conditions of rapidly changing pressure), we crossed the connecting bridge into the control room and spoke with Mr. T. V. Small, A.F.R.Ae.S., who is in charge of the actual test work being carried out in the chamber. The arrangement of the overall programme of work is the administrative responsibility of Mr. V. H. Mole-Dennis.

An immediate indication and a precise control of the test conditions in the chamber are available to the controller in the well-designed and roomy control room. To the left of two long desks are continuously recording instruments for pressure, temperature and humidity. On the left-hand desk are no fewer than 260 pairs of electrical terminals, with connections inside the chamber, enabling the measurements of control-surface Desynns, electrical thermometers and strain-gauges on the test specimen to be noted or recorded in the control room, photographs taken, or other electrically actuated equipment operated. Dials for a selected number of measurements are built-in.

Between the two desks are a press-button temperature indicator for various points in the chamber, a mercury U-tube giving the chamber pressure, and an accurate laboratory barometer. At the controller's position on the right-hand desk are intercom facilities, chamber altimeter and oxygen supply dials, and a panel which carries a simplified plan of the working section on which are shown all intercom and oxygen positions. As the test personnel move around between these positions in the chamber, and plug in the intercom and oxygen facilities, small bulbs on the controller's panel light up at the appropriate points, giving an indication of the test workers' movements. At the other end of the controller's desk are the controls for adjusting the speed of the four fans in the air-circulation ducts.

Since the chamber became fully operational in 1951, a variety of test projects have been performed in it. These include engine cold-starting trials, tests of powered control units and turbo-starters, generator brush-wear investigations, and studies of the behaviour of a number of aircraft and guided-weapon structures, control surfaces and systems and items of electronic equipment, under various low-temperature and high-altitude conditions. The ability to mount an aircraft pressure-cabin in the chamber is, of course, an important advantage (the Viscount cabin at the time of our visit was being used for a number of investigations into minor operational problems).

In addition to its use for Vickers' own aircraft work, the



Cross-sectional views of the test chamber, showing the flow of air through the working section. The corner vanes provide methanol cooling as well as their aerodynamic turning effect. The two air-lock compartments used for the entry of personnel are seen at the left-hand end.

(A) Bridge from control room
(B) Cold lock
(C) Pressure lock
(D) Thermal insulation
(E) Test chamber
(F) Observation windows
(G) Break joint
(H) Great door
(J) Sealing pad
(K) Great door carriage
(L) Reinforced concrete beam
(M) Concrete floor
(N) Foundation bed
(O) Insulating cellar
(P) Insulating support block
(Q) Fan motors
(R) Vacuum pipe
(S) Brick piers
(T) Dry air inlet pipe
(U) Cooling and turning vanes
(V) Air circulation duct
(W) Expansion bellows
(X) Air circulation fans
(Y) Chamber support
(Z) Access to windows

chamber has been made available for the projects of external organizations. The testing of naval gun mountings and radar gun-directors at low temperatures and high wind-speeds has been one such example, for which special high-speed nozzles were fitted to the lower air-ducts. Another investigation, jointly sponsored by Imperial College and Bristol University, involved meteorological balloons. In order to determine the structural strength of alternative materials for the balloons, and the functioning of the release mechanism and radio equipment, tests were made at temperatures down to −60 deg C, and simulated altitudes up to 62,000ft. An interesting feature of this experiment was the use of infra-red and ultra-violet light to simulate solar radiation, which caused the interior of the balloons to be at +40 deg C while the outside air temperature was −60 deg C.

The space around and beneath the pressure shell, but within the thermal insulation, is effectively at the same temperature as the main chamber, and is frequently used for tests which require cold conditions without simulated altitude. No special tests of the effects of altitude and low temperature on flying clothing or personnel have been carried out, but relevant information on these effects is recorded and passed to the Institute of Aviation Medicine at Farnborough, and a certain amount of development work on personal equipment has been performed, such as that on the flexible rubber tubes for oxygen.

Much and varied experience has been gained in the use of the stratosphere chamber during its 2½ years of operation, small modifications to the refrigeration system being the only alterations required. The research and development team seem well pleased with their huge test chamber, and have already made excellent use of it. To meet the continued and essential need for thorough high-altitude research and test in the field of aircraft and associated equipment in this country, the facilities of the "big flask" at Weybridge are second to none. K. T. O.

A non-aeronautical project was the study of the effect of cold weather on a naval gun turret. For this test, special nozzles (seen in the "great door" photograph on page 260) were fitted to increase the air velocity.

ECONOMICAL STRETCH-FORMING

AT the Brough factory of Blackburn and General Aircraft, Ltd., considerable time is being saved, and economy secured, by the use of works-designed stretch-forming equipment for contouring strip material of various sections.

The method—which is the subject of a patent application—is so simple that the tool can be constructed mainly of lengths of channel steel and a few bolts and nuts. Designed for mounting on the bed of any suitable type of stretching machine, the tool consists essentially of an elongated open-topped box built up of three bolted-together sections of channel steel, one of the two side-walls being slot-and-bolt mounted so that it can be set at any required distance from the opposite wall.

The workpiece is clamped in the stretcher jaws and so positioned that it abuts against the contoured surface of a wooden form-block in the bottom of the "box." If, for the sake of example, the work is of simple angle section, one web will contact the surface of the form block and the other will locate between the side of the form-block and one steel wall; a rubbing-pad (e.g., of compressed fibre) is interposed between the wall and the work to allow the latter to slide during the stretching process.

For sections more complex than simple right-angles, the surface of the form-block is supplemented by any requisite number of fibre strips, which allow any required section to be contoured from the one block; they also permit the work to slide while adapting itself to the contour. Simple adaptations also make it possible to produce double curvatures and joggles.

Blackburns state that five sets of equipment of this kind at Brough are now doing the work of several hundred form blocks.

AIRFIELD-EMERGENCY RADIO

A CONTRACT worth £70,000 has been awarded to Pye, Ltd., of Cambridge, for V.H.F. communications equipment to be installed in crash-rescue vehicles at Air Ministry airfields in Great Britain. The equipment is particularly useful when vehicles are sent to attend a crashed aircraft out of sight of the control tower. Information can immediately be passed back and the tower kept informed of the condition of the airfield if the runway is obstructed or if reinforcements are required. Crash-rescue vehicles at White Waltham were fitted with the sets while the Duke of Edinburgh was undergoing flying training there.

THE THROTTLE-BENDERS

No. 5 W. P. BOWLES

By H. J. COOPER

WITH the publication of this article we resume the sequence describing the air-racing careers of the "Throttle-Benders' Union"—the unofficial society of regular participants in British air races. The previous story in this series—dealing with Ron Paine—appeared on March 28th, 1952. Before that, H. J. Cooper wrote of S/L. J. Rush (July 6th, 1951), J. N. Somers (October 5th, 1951), and A. L. Cole (November 30th, 1951).

THE newest member of the Throttle-Benders' Union, Walter Bowles, had his first racing success at Newcastle in 1952, when he won the Norton-Griffiths Challenge Trophy. Although he did not fly in his first race until 1947, he has in fact been a pilot since 1935, when, at the age of 32, he took his "A" licence at Hanworth on a Gipsy Moth of the London Air Park Flying Club. His instructor was David Llewellyn, who later flew an Aeronca C.3 monoplane solo to Johannesburg.

Walter Bowles says that he first felt the thrill of air racing as long ago as 1914, when he was taken by his father to see the Aerial Derby of that year, which, starting and finishing at the London Aerodrome, as Hendon was then called, covered a distance of 94.5 miles, with turning points at Kempton Park, Epsom, West Thurrock, Epping and Hertford.

But it was not until many years later, when his wife saw it advertised in a newspaper that the Hanworth Club was offering a complete course of instruction for £15 (a very low rate even in those days), that he entertained the idea of flying himself.

The instruction was being offered on the Aeronca, which was originally built in America and was then in production in limited numbers by the British Aviation Manufacturing Company at Peterborough. It so happened that a licence for dual instruction on this type was subsequently withheld, so pupils were in fact trained, at a slightly higher rate, on Moths. After 8½ hours' dual Walter soloed on G-ACOA, one of the Club's Gipsy Moths.

He then became a member of the London Aeroplane Club at Hatfield and, with a special interest in aerobatics, took some further dual on Tiger Moths. Among his instructors there at that time were Joe Harris, Jack Goodyear (now assistant manager at London Airport) and O. F. Maclaren, who is now with Dunlop's aviation department.

In the happy flying days before the war, Bowles flew regularly as a club pilot. He became friendly with F. J. Bush, who then owned the famous Moth "Four As" (G-AAAA—which had been the property of Captain Ivor McClure) and, sharing expenses, they made a number of air tours in this country and abroad. Joe Bush, by the way, was to lose his life at Prestwick early in the War, flying a Liberator with A.T.A.

Bowles soon wanted to have an aeroplane of his own, and in 1937 bought a Kronfeld (B.A.C.) Drone, G-AEKU, fitted with a 32 h.p. Carden engine. But, although this aeroplane was a suitable mount for the ultra-light-aeroplane enthusiast, Walter realized that he wanted something with more power and a better performance. The Drone's cruising speed was just not high enough. On one occasion he flew it from Hanworth to Hatfield while his wife did the same journey by road—and she arrived first!

Soon after the war started, Bowles volunteered for the R.A.F., and after an O.C.T.U. course at Loughborough went for a 25-hour Link trainer course at Elstree. On passing out he was posted, as acting pilot officer, to No. 27 E.F.T.S. at Induna, Bulawayo, to assist the hard-pressed instructors there in giving instrument training to pupils of the Empire Air Training Plan. The ship on which he sailed took 40 days to reach Durban, and in December 1940 he was able to begin his duties. His family, consisting of his wife, 14-year-old son and 10-year-old daughter, were to follow in April, but were unfortunate enough to sail in the *City of Nagpur*, which was torpedoed by a U-boat 1,000 miles off the Irish coast. After 24 hours in a lifeboat they were spotted by a Catalina and were taken back to Scotland in the destroyer *Hurricane*. Five weeks later they were able to sail again, this time without serious enemy interference.

F/L. Bowles, as he then was, stayed in Southern Rhodesia until November 1944, having been transferred to No. 21 S.F.T.S. at Kumalo. He did about 5,000 hours on Links and gave instruction to literally thousands of pupils.

"Flight" photograph

Walter Bowles "has not tried to beat the handicappers other than by his painstaking polishing"—in which he often enlists the help of his wife (by the Messenger's rudder) and daughter.

But all his flying was by no means on the ground. At every opportunity he took up the Tigers, Harvards, Oxfords and Ansons, giving them their test flights in the afternoon when they were to be flown by pupils at night. He did in fact take an instructors' course, but with his valuable Link experience was kept grounded, more or less, for the whole of his time in Rhodesia. He got back to England at the beginning of 1945.

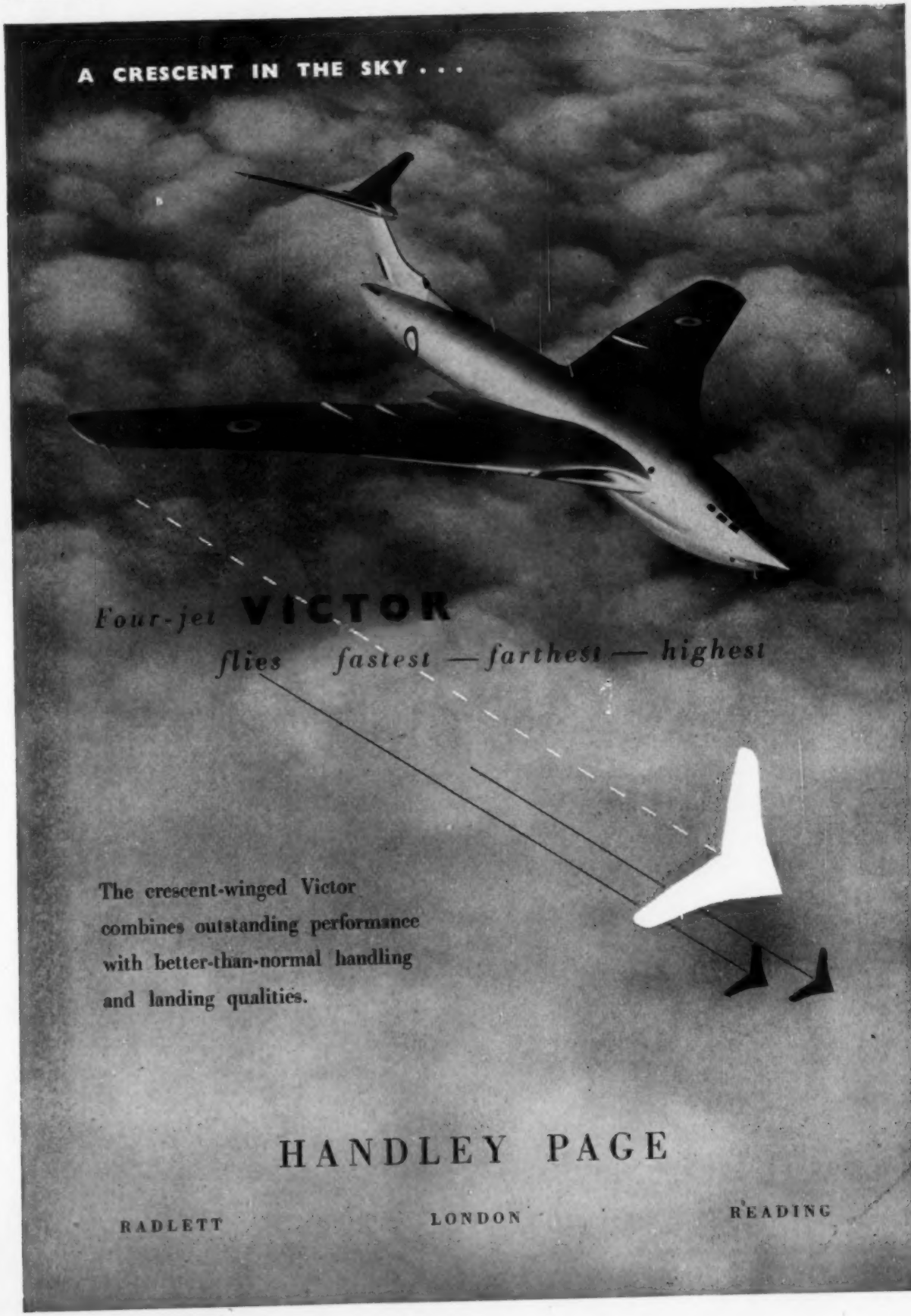
When private flying was again possible he was soon active with the London Aeroplane Club, and in April 1946 he bought a Hornet Moth, G-ADJV, for his own use, keeping it at Elstree, which is within reasonable reach by car of his home at Pinner. This Hornet was used for private flying generally (Walter was among the first British pilots to fly a private aeroplane round Europe after the War) and for travel to continental air rallies.

In August 1946, when taking off in this Hornet from Panshanger, he experienced an engine cut at fifty feet. Keeping straight ahead, he had no alternative but to plough through hedges and fences, with broken longerons as the major damage. While the aircraft was being repaired he used an Auster Autocrat, and then for a time owned a Fairchild Argus (Warner-powered—the Ranger version had not been licensed for civil flying in this country). This Fairchild, G-AIYO, was later sold to the Women's Junior Air Corps.

His next aeroplane was the one and only Miles M-48, G-AGOY, which he bought from Handley Page, Ltd., who were then taking over the Miles factory at Reading. This aeroplane, which was formerly owned by a Swiss private owner as HB-EIP, was basically the same as the M-38 Messenger, but had retractable flaps in place of the projecting plain-hinge type. Its speed was slightly above that of the Messenger.

Walter Bowles regarded the Messenger as one of the most suitable of existing designs for combining private flying with air racing and touring. He soon acquired another one, G-AKBN, which was built by the Northern Ireland branch of Miles Aircraft in 1947. It was in this aeroplane that he flew in his first race.

At Whitsun of that year the Bembridge Aero Club organized a round-the-Isle-of-Wight Race, which was among the first of the post-war races; the rally of which it formed part was a very popular affair, with over 70 visiting aircraft. Although Walter did not gain a place (he finished sixth) he did receive the cup for the *Concours d'Elégance*, for he makes a point of keeping his aeroplanes in spotless condition, and its smart blue colour scheme and finish were the result of hours of exhausting polishing. That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This is a single speed governed series motor which has been developed for use in time switches etc., although its applications are many. It can be supplied as a split series unit where a reversible motor is required. Special brushes are fitted which make the motor suitable for high altitude work without the pressure cabin, and these brushes show a life period of 760 hours at 3000 r.p.m. The governor is a highly developed centrifugal type capable of holding the motor speed accurately. A resistor is paralleled across the governor contacts.

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Rating	0.4 amps at 24v DC (nom)
Torque	12 gm. /cms. (max)
Speed	3000-11000 r.p.m.
Speed Tolerance	± 3%
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THE THROTTLE-BENDERS . . .

race was won by another Throttle-Bender, Geoffrey Alington, in Sparrowhawk G-ADNL, which (now owned by Fred Dunkerley) has undergone a metamorphosis at Shoreham and Redhill and, powered by two Palas turbojets, now flies as the Sparrowjet.

Walter raced again in the next year's Isle of Wight event (accompanied, as in many subsequent races, by his wife) and came in third, being passed by Alington while both were trying to catch R. Spackman, who was first over the line in a Tiger Moth.

At the first National Air Races, at Birmingham in 1949, Bowles entered G-AKBN for both the King's Cup and the Norton-Griffiths races. In the former he averaged 127 m.p.h. but, finishing sixth in his heat, did not qualify for the final. In the Norton-Griffiths race he had some bad luck. He had just passed Jim Mollison (General Aircraft Cygnet) and in his words "had the best possible view in an air race—there was no one in front," when suddenly his wooden airscrew broke in two at the hub and vanished. Some quick thinking, and he was safely down in a field at Maxstoke, on the Corley-Coleshill leg of the course, with no harm to his wife or himself.

In the next year's King's Cup (1950) he flew KBN into eighth place at 131 m.p.h. over the course at Wolverhampton. For the 1951 Goodyear Trophy race he acquired a new Messenger 2a, G-AJYZ, fitted with a 155 h.p. Cirrus Major 3 engine. It was built at his request by Handley Page (Reading), Ltd., in 1950 from components already completed. As it was a new aeroplane with engine hours nil, he did no more than cruise it round the course. He averaged 121.75 m.p.h., but as he expected, was not placed.

With the abandonment of the 1951 National Air Races at Hatfield, Bowles transferred his King's Cup entry to the *Daily Express* South Coast Air Race, flown from Shoreham on September 22nd, 1951. On the cross-country leg of the course, ten minutes before reaching Reculver, he found himself alongside Pat Fillingham, who was flying the enclosed Moth Minor, and who had taken off just before him. After an exciting little battle, Bowles found he was getting the better of Pat; then, near Ramsgate, one of his magnetos packed up and he began to lose way. At the finish Fillingham beat him by one second. But Walter was in fact ninth over the finishing line out of 63 starters, making 136 m.p.h., the highest speed JYZ attained.

The 1952 Goodyear race saw JYZ fly into fifth place at 133.5 m.p.h.; and at Newcastle in 1952, when the Royal Aero Club arranged the National Air Races at one two-day meeting, Bowles entered again for the Norton-Griffiths race, which that year was limited to aeroplanes of between 750 and 1,000 kg weight. During this race the weather became worse than it had been, and several rain squalls reduced visibility almost to nil. It was, Bowles says, the hardest fight he has had in a race, and conditions were extremely bumpy. Fortunately the last leg of the course was clear and, after overtaking Jan Christie in his Norwegian-registered Leopard Moth and passing another Messenger, flown by Rodney Matthews-Naper, Bowles was first to finish, at 132 m.p.h., just ahead of M. R. T. Chandler who, coming in very low, flew clean through high-tension cables and nearly wrote off Edward Day's Hawk Trainer which he was flying, nevertheless making second place.

Winning the Norton-Griffiths qualified Walter for flying in the King's Cup the next day, and he took off eighth out of the 23 starters. Conditions were still bad, and at one point a bump dropped JYZ so heavily that Bowles hit his head on the roof with some force. The Messenger was temporarily jolted, and the pilot lost some valuable seconds before he was able to get back on his true course. It has been brought home to all racing pilots that even a few split seconds lost can have a vast effect on the finish, and JYZ's average speed at the end of the race was found to be 0.5 m.p.h. slower than in the Norton-Griffiths race. His speed was 131.5 m.p.h., and Walter fell back to 17th place.

Like the other racing pilots who attend all the important race meetings, Bowles believes in making as many practice flights as possible over the course, and their value is to be found in the consistency of the recorded lap times, which, in most cases, do not vary more than one or two seconds. It is of vital importance to be dead on course, to begin to turn round a pylon at precisely the same time and place on each leg, to hold the bank and to come out exactly over a particular house or tree or any other chosen landmark. The shorter the course the more important is the practice lapping.

After Newcastle, Bowles stood third in the Championship scheme with 37 points. He finally held 17th place, despite having had to retire from two of the eligible races.

In the *Daily Express* race in August 1952, Bowles suffered another misfortune. On the cross-country leg between Newhaven and Reculver he was doing nicely when, once again, he lost his airscrew. This time the crankshaft of the engine broke, and he had to put down in the first suitable field he saw. Once again there was no damage, but obviously the Messenger could not be flown for a while. An example of how he works as a team with his wife is shown by the fact that she immediately drove from Shoreham to collect him.

Bowles flies Messenger G-AJYZ out of a small field near Canterbury after a forced landing in the 1952 "*Daily Express*" *South Coast Race.*

The manufacturers of the Cirrus got to work on the Messenger, and only three days later Walter was able to fly it out of the field with a new engine—a splendid example of the company's genuine interest in their products and in their customers.

In the Siddeley race at Baginton, Coventry, on August 23rd, 1952, he had to retire yet again. After completing half a lap he found his oil pressure had dropped and, rather than race the newly-powered Messenger and risk seizing the Cirrus Major, he decided to abandon the race. As the competitors in the race were completing their laps and flying across the aerodrome he went up to 2,000ft to cruise around until the finish, and saw Pat Fillingham fly his Chipmunk to victory and become the first British Air Racing Champion.

In September 1952 the Southern Aero Club organized a meeting at Shoreham in which two short-circuit races were flown. The first was an open handicap for light aeroplanes over three laps of a 15-mile course, and the second consisted of six laps over a 5.2-mile course, competitors in which were limited to pilots invited by the Southern Aero Club—namely, five members of the T.B.U. A very exciting race was the result, and well rewarded the enterprise of the Club in proving that a short course can be safe for experienced pilots. One result of this meeting was that the Royal Aero Club fixed a short (ten-mile) course for the National Air Races at Southend last year. Walter Bowles, flying JYZ, won the Shoreham race at 127.5 m.p.h., with Nat Somers chasing him into second place in his Gemini.

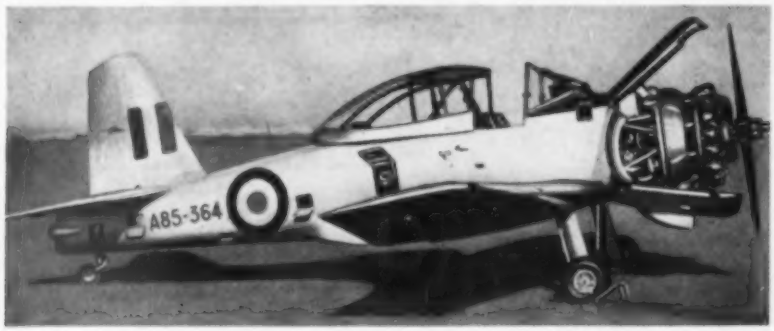
That was the last of the 1952 races, but Bowles naturally took every opportunity of competing in those of the next year. The first was the Goodyear Trophy at Wolverhampton on May 16th, when he could not reach higher than ninth place; and he reached only sixth place in the Welsh Air Derby at Swansea on May 30th. But at Southend he really got going. In the Norton-Griffiths race he averaged 129.5 m.p.h., and after a very close finish was first over the line after the three laps of the course, with Pat Fillingham three seconds behind him, and Prince Alexander coming in third in his Proctor one second later. This win qualified Bowles for competing in the King's Cup, flown over six laps of the same course, in which he got 133 m.p.h. out of the Messenger. But Fillingham too had found some more speed in his Chipmunk, and overtook him near the finish, making first place, with the Messenger coming in only one second later.

The last race of the 1953 season was that for the Siddeley Trophy at Coventry on August 22nd, but in this the Messenger, representing the London Aeroplane Club, gained only tenth place in its heat and so did not qualify for the final. Nevertheless Bowles was finally placed third (jointly with Ron Paine) in the Championship with a total of 47 points—no mean achievement for a pilot whose racing goes back only to 1947.

Walter Bowles regards air-racing purely as a sport. He has not tried to beat the handicappers other than by his painstaking polishing, and the fairing of control hinges; if he does not gain a place he still enjoys the race for its own sake. For him, flying is a hobby, to be pursued as relaxation from his work as a director of a motor company.

For this year's racing he is forsaking the well-tried Messenger and now has a Gemini 1a, G-AKDK (two Cirrus Minor 2s), and proposes to fly it at the National Air Races, which are to be held at Baginton, Coventry, on June 18-19th. He is at present stripping it of its original paint, and will put on his own particular choice of paint and polish.

AIRCRAFT INTELLIGENCE



ACCESSIBLE AUSSIE: Now in production by the Commonwealth Aircraft Corporation is the Winjeel, the R.A.A.F.'s new basic trainer. This photograph, recently published in the Australian journal "Aircraft," shows the petal-cowled Wasp Junior to advantage. A comparison with the Provost would be interesting.

Great Britain

Vickers-Armstrongs 1000. Various types of "1000-series" aircraft are now being considered with both by-pass (Conway) and pure-jet engines. The first prototype, which appears likely to be Avon-powered, is now beginning to look like a complete aeroplane; it is expected to fly in the first half of 1955, and should be at that year's S.B.A.C. show. It gives promise of being a most useful aircraft, and there is every possibility of its selection as a standard high-capacity transport for R.A.F. Transport Command. A fact not previously mentioned is that, if angle of sweepback is any criterion, the 1000 series are designed for a much higher cruising Mach number than is the smaller Valiant.

Canada

Canadair Britannia. The engineering department of Canadair are now hard at work modifying the basic Bristol Britannia for the R.C.A.F. as a maritime reconnaissance aircraft. To some degree the M.R. Britannia should correspond with the British "stretched" series 200, 250 and 300, particularly as regards fuselage length. But the Canadair machine will be of quite different shape, and will have a longer nose and increased all-up weight. The British Messier bogie landing gear should be quite capable of use with a Britannia as heavy as 170,000 lb, with slight modification. Although the M.R. machine is designed for medium- and low-level operation, and has Turbo Compound engines for this purpose, it is likely to be pressurized throughout. This will make it difficult to incorporate a large internal weapons bay, although such a feature has been suggested. It has been stated that the specified armament includes fixed guns and torpedoes, the latter presumably being of the anti-submarine homing variety.

N.R.C. Meteor. A Gloster Meteor is, according to a correspondent, now being assembled by an R.C.A.F. repair crew at the flight research section of the National Aeronautical Establishment at Uplands, Ottawa. It is reported to be on loan from the M.o.S. to the Canadian National Research Council to assist in testing a reheat system developed by the N.R.C. The Rolls-Royce Derwents are retained.

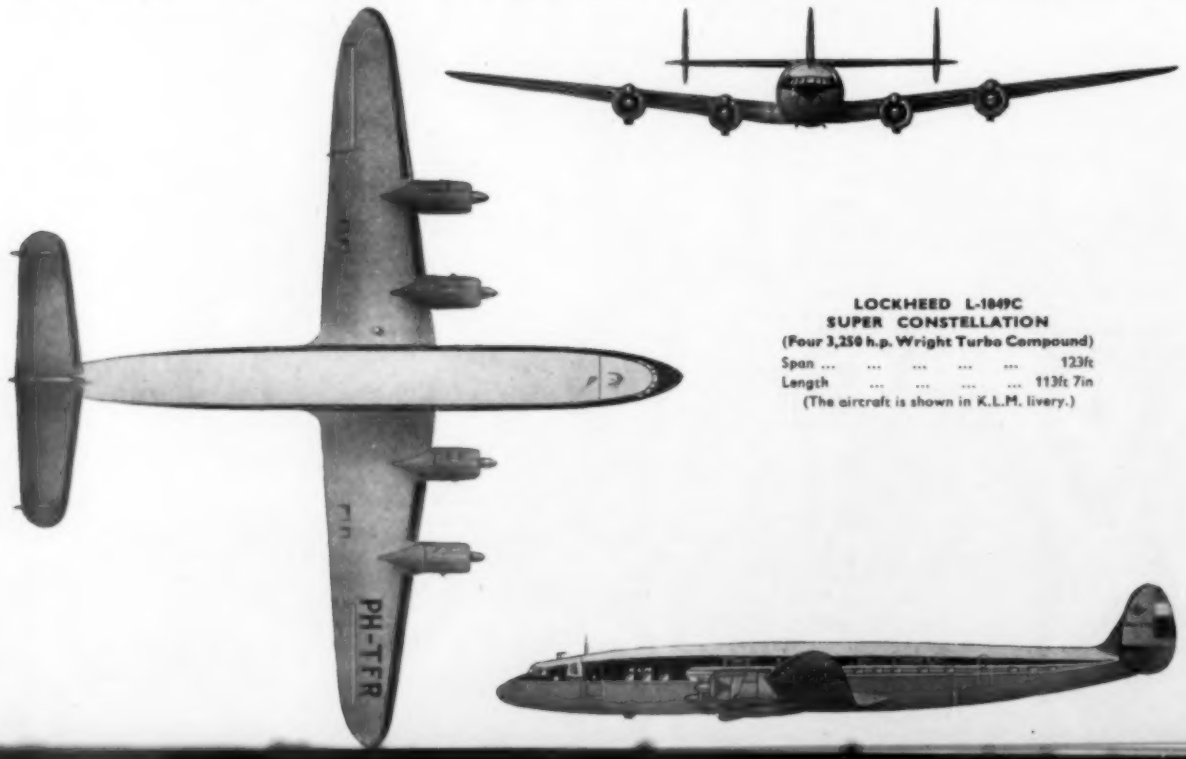
United States

Cessna Helicopter. Last year the Cessna Aircraft Company formed a helicopter division, the nucleus of which was no doubt provided by the helicopter-designing firm of Siebel, which was taken over by Cessna at that time. Siebel had developed an experimental machine styled S-4A Sky Hawk, which had been awarded the U.S.A.F. pre-production contract under the designation YH-24. Cessna now state that their helicopter division has developed an entirely new 2-4 seat, all-metal helicopter, for which details will be available in the summer.

France

S.E. Sea Venom (Aquilon). For seven years past the South-East group of the French nationalized industry has been producing fighters of basic de Havilland design. First came the Vampire, in various forms; it was followed by a developed model powered by a Hispano Nene and known as the Mistrale. Now the last Mistrale has been delivered, on schedule, and its place is being taken at Marignane by the Sea Venom. S.E. are now in full production with a machine very similar to our Sea Venom F(AW)20; in France it is known as the Aquilon (North Wind) and it is powered by a Fiat-built Ghost 48.

S.N.C.A.S.O. Fighter Prototypes. All the flying so far completed on the first and (ill-fated) second S.O.9000 Tridents has been on the power of wing-tip turbojets. The design main power unit, a three-cylinder S.E.P.R. liquid-fuel rocket is now almost ready for installation. With the rocket fitted (in the tail) the Trident should be easily supersonic on the level at high altitude. Test pilot Charles Goujon is taking the first Trident through a special series of trials in preparation for the rocket flying. At the same time, a four-year-old S.O.6020 prototype (Espadon) has been equipped with two Turboméca Marboré turbojets with afterburners, one at each wing tip. The basic Marboré gives about 880 lb thrust, so the revised Espadon test-bed should obtain about 2,200 lb thrust from the added wing-tip units. It was, incidentally, on an Espadon-type machine, an S.O.6026, that the Trident's rocket was tested, in single-barrel form.



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(Four 3,250 h.p. Wright Turbo Compound)

Span	123ft
Length	113ft 7in

(The aircraft is shown in K.L.M. livery.)

Air Power at Sea

H.M.S. OCEAN

An 80 gun French warship, captured in 1769, was immediately re-named *H.M.S Ocean*, but being found crippled and unseaworthy her captors destroyed her by fire without delay.

The 5th ship of the same name is the Light Fleet Carrier, commissioned in 1945. *Ocean* completed two tours of duty in Korea. The Boyd Trophy, awarded annually for the most outstanding feat of aviation in the Navy, was won by Squadrons 802 and 805 embarked in *Ocean* in 1952. In 79 days of flying the average daily sortie rate was 76.3. Before her foreign service, this already famous ship was one of the Navy's principal trials carriers: she was the first British ship to fly off jet aircraft, heralding the conversion of the Fleet Air Arm to turbine-powered aircraft such as the anti-submarine Fairey Gannet.

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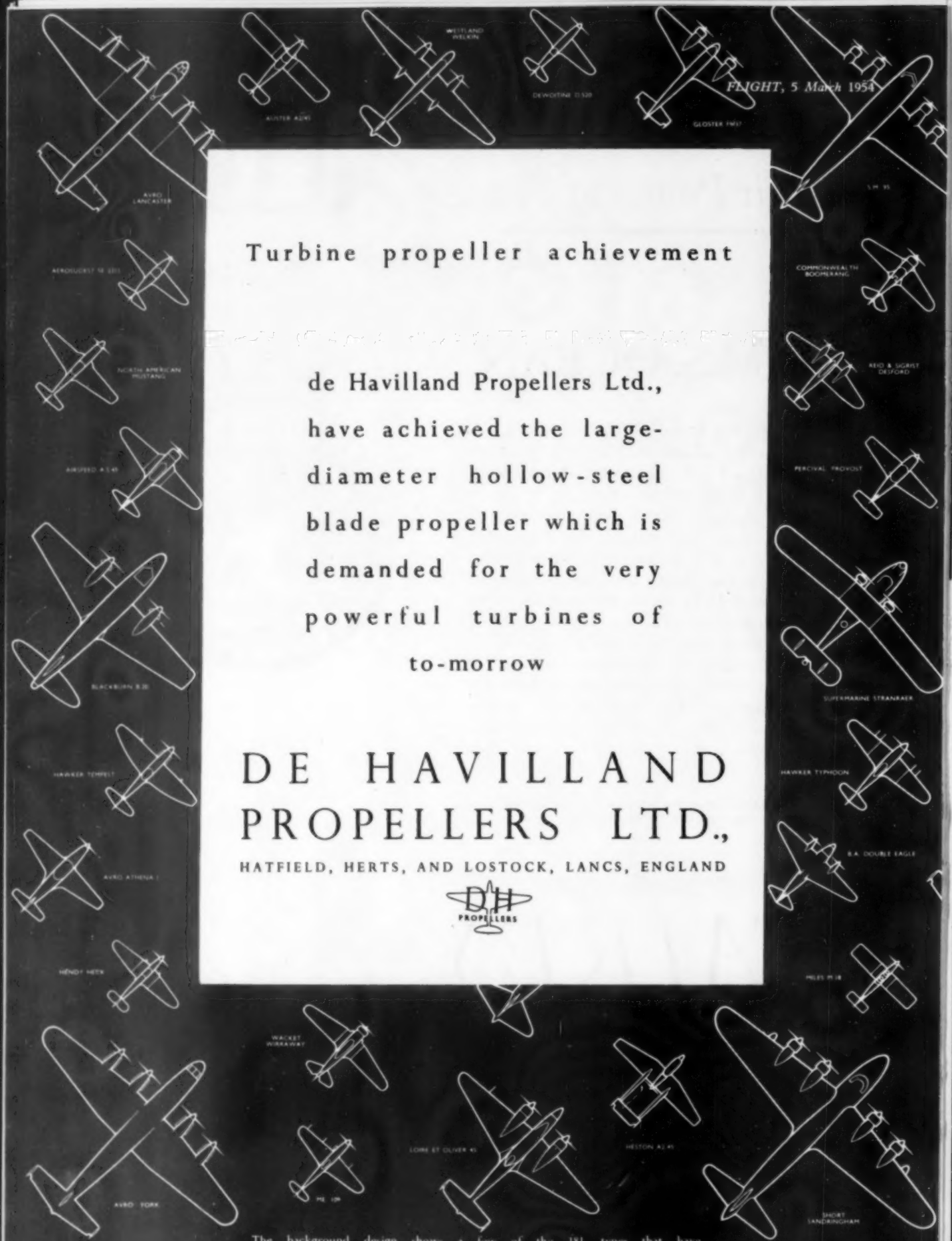

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DH PROPELLERS

The background design shows a few of the 181 types that have been fitted with de Havilland propellers in the past 18 years.

FIFTEEN YEARS' SERVICE

A NEWS paragraph last week recorded an Air Ministry announcement that the last operational squadron of the R.A.F. to fly Vickers-Supermarine Spitfires had completed re-equipment with jet aircraft. It was a unit of the Far East Air Force, based in Malaya but also operating a flight from Kai Tak (Hong Kong); and at Kai Tak the photograph below, showing a Spitfire P.R.19 of the squadron, was secured by *Flight* photographer L. W. McLaren while returning from Korea last year. This picture affords a most interesting comparison with that of the very first Spitfire, above, taken by John Yoxall during June 1936 at Eastleigh. Keen-eyed readers will spot that the historic "K5054" is in company with an early Walrus and the prototypes of the Vickers Wellesley and Wellington. As both views were secured from almost identical angles, it is possible to note at a glance some of the changes made in the intervening years. Immediately apparent is the five-blade airscrew of the P.R.19 and the longer nose, housing the Rolls-Royce Griffon instead of the original Merlin. Revised cockpit lines, a redesigned tail and retractable tailwheel on the P.R.19 are other points of dissimilarity, as are the fin flash and large roundel; but both machines are "Spits" beyond any shadow of a doubt.

PASSENGER LOG

By ROBERT J. BLACKBURN

"Flying Clipperwise" to Frankfurt and Berlin

"AT last! We've kept the flight waiting for you since nine-thirty." This from the P.A.W.A. station officer who met me on arrival at London Airport one recent Monday morning. Sure enough, I could see the Stratocruiser waiting on the apron ready for departure, but my pride in having personally kept a "giant airliner" waiting for two hours was mixed with surprise, since I had reported at the time given to me.

An explanation appeared as, at record speed, I was propelled through Customs, past Immigration and across the marshalling area to Clipper *Washington*. The aircraft had flown direct from New York and arrived well ahead of schedule because of a strong tailwind. A correspondingly early departure for Frankfurt was prevented only by the fact that one passenger—myself—had booked to come aboard at London.

The journey promised to be an interesting one on several counts. In the first place it provided an opportunity of sampling the comfort of a transatlantic-type first-class flight, and of Pan American service, without the expense or time involved in actually visiting America. Frankfurt, the most important airport in Germany, is not only the main European terminal for PanAm's long-distance services but the centre of an extensive regional network operated by this enterprising American carrier in the absence of German air sovereignty.

Most of the Stratocruiser's passengers had disembarked at London and only about half a dozen remained for the final leg to Frankfurt. However, about 60 more had already gone ahead on that day's "Rainbow" tourist service, operated by DC-6B.

As fitted out for the luxurious "President" service, for which a $25 (£9) surcharge is made, the Stratocruiser carries up to 59 passengers in great comfort. Although it has been flying the North Atlantic since June 1949, the big Boeing is still a very competitive aircraft for the route. The DC-6B and L.1049C are slightly faster, and from the range viewpoint they correspond more closely to the ideal of a non-stop transatlantic airliner, but they lack the ship-like spaciousness of the Stratocruiser's interior.

Aeronautically, there is nothing very novel about a scheduled airline flight to Frankfurt, but as this was my first trip with PanAm I found much to interest me. First a sortie below decks *via* the spiral staircase to the 14-seat lounge. The bar was closed, so in solitary comfort I was able to enjoy an uninterrupted view of Kent 11,000ft below. Suddenly a loudspeaker on the forward bulkhead emitted a crackling cough and announced itself as Captain Blair,

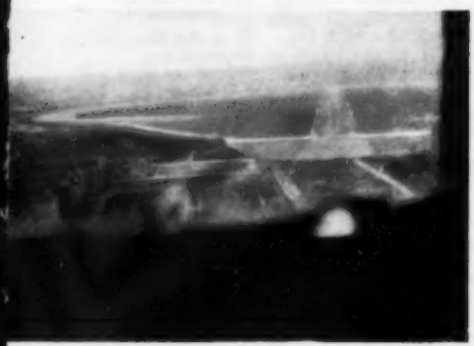
Eight large transports can be accommodated on the covered-in apron at Tempelhof; on the left are seen the stairways which give access to the actual terminal building. This impressive structure escaped serious damage during the war.

(Above) Terminal building at Rhein-Main, with two P.A.W.A. DC-4s in the foreground.

The bright, spacious interior of Frankfurt's terminal matches the clean exterior design.

Evening on the flight deck of Clipper "Constitution" while returning to London. The River Scheldt at Antwerp reflects last light.

Clipper "Washington" on arrival at Rhein-Main, after flying from New York via London.



"Clipper one-eight-two—you're in the slot" —final approach at Tempelhof.

"FLIGHT" Photographs

Symbol of the Russian shadow over Berlin: the Soviet war memorial in 17er Juni Strasse, just inside the British Sector.

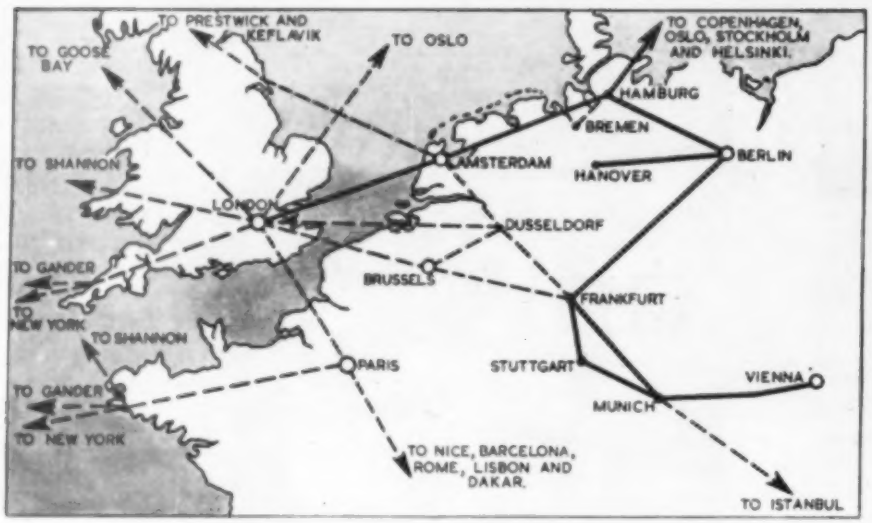
adding that our E.T.A. at Frankfurt was 1330 local time.

The skipper's name sounded familiar. Later I learned that he was indeed *the* Capt. Blair who, in May 1951, became the first man to fly a single-engined aeroplane over the North Pole. This he achieved in his own F-51 Mustang, using a self-developed navigation technique, having previously flown this aircraft from New York to London non-stop in 7 hr 48 min.

I found Charles Blair to be a lean man of 6ft 4in, with a youthful appearance which conceals the fact that in the course of a flying career beginning with the U.S. Navy in 1928 he has logged over 20,000 hours and has made more transatlantic crossings than any other pilot. "Exactly how many?" I asked. Blair consulted a series of log-books and said he reckoned that morning's crossing had been his 539th. As a full-time captain with Pan American, he flies about 800 hours per annum and as a reserve colonel with the U.S.A.F. he puts in another 200 hours' part-time flying, mostly on F-84 Thunderjets.

He told me that on the basis of this jet experience he hopes to be one of the captains selected for PanAm's Comet 3s (due for delivery in 1956) and added that he was looking forward to a ride in the Series 2 with John Cunningham. Despite his evident enthusiasm for the Comet, Blair said that experience of flying B-47 Stratojets had led him to appreciate the value of pod-mounted engines. Towards the end of the flight to Frankfurt he feathered No. 3 Wasp Major. This, I learned, was a precautionary measure taken in view of some minor vibration. "The power was there if we needed it," said Blair, "but that way you can save a $55,000 engine."

Enjoyment of a very smooth and quiet trip was quickened by the serving of lunch. One of the strong selling points of the "President" is the excellent cuisine, by Maxim's of Paris. A personal touch greatly appreciated by the passengers is the



The European regional network operated by PanAm's Frankfurt-based DC-4s is outlined on the left. Broken lines indicate the routes followed by the long-haul services, operated mainly with luxury Stratocruisers and tourist-class DC-6Bs. These provide connections to the Near and Far East, South Africa and most parts of the Western Hemisphere. Paradoxically, the airline has no domestic traffic rights in America.

presentation of small individual bottles of red wine, specially bottled for the airline in Maxim's cellars.

Perusal of "flight companions" aboard airliners is always an interesting pastime and the collection of literature on this journey was one of the largest I have ever seen. It consisted of a booklet entitled *Flying Clipperwise* with pockets containing the following items: timetables; pamphlets on (a) how to clear American Customs, (b) how Americans should behave when travelling abroad and (c) how to ship freight by Pan American; colour postcard of the Stratocruiser; a currency converter; international time scale; and a list of "beverages and diversions" (including backgammon, poker dice, electric razor and Benzedrex inhalant). There was also a booklet on the past, present and future of Pan American, with a model of the Comet 3 as the cover illustration.

The first indication that we were nearing Frankfurt was the sight of a number of C-119 Packets orbiting in the distance like bees around a hive. Rhein-Main is, in fact, two airports in one, being provided with separate military and civil terminal areas on opposite sides of the parallel runways.

On embarking from Clipper *Washington* outside Frankfurt's clean and modern terminal building, my first object was to seek our Arthur Wallis, assistant to Dick Forhan, the regional director of PanAm. Wallis is an Englishman who left Fleet Street to take up public relations work for American Overseas Airlines in London and transferred to PanAm when it absorbed A.O.A. in 1950. He and his colleague, Bill Voigt, showed me that, although worked with only a small fleet of DC-4s, PanAm's regional operations in Germany are equivalent to those of many local airlines. The scale of operations is indicated by this list of winter services operated by DC-4s alone:

Route	Round trips weekly
London - Hamburg - Copenhagen - Stockholm - Helsinki	1
London-Hamburg-Oslo	1
Hamburg-Berlin	19
Hanover-Berlin	26
Frankfurt-Berlin	27
Frankfurt-Stuttgart-Munich-Vienna	5

These services add up to over 250 hours weekly, which implies an average daily utilization of seven hours per aircraft—excluding extra services, charter flights or training. There is an almost infinite number of connections with the airline's long-distance Stratocruiser and DC-6B services to and from Frankfurt, Dusseldorf and Hamburg. From Frankfurt during winter there are four "President" and five "Rainbow" services weekly to New York. Other flights go south through Rome to the Middle and Far East or by way of Spain and Portugal to South Africa and South America.

About 500 people are employed by P.A.W.A. in Germany, of whom just over 85 per cent are Germans. All the pilots are, of course, among the 70 Americans, but German stewardesses are employed on all the regional routes. The DC-4s, which are named *Berlin, Munich, Frankfurt, Dusseldorf* and *Hamburg*, are usually operated by two pilots and a stewardess. Most of the services are flown along the air corridors linking Berlin with Hamburg, Hanover and Frankfurt, a major source of traffic being the exodus to Western Germany of refugees from the East.

Equipped with five-abreast seats holding up to 56 passengers, the DC-4s offer reasonably comfortable tourist-type travel, which I experienced by taking the 10 a.m. "Berliner" out of Frankfurt (the first of four daily flights to the capital). Clipper *Munich* flew I.F.R. most of the way so all hopes of even glimpsing a Mig were dashed. The Russian fighters are seen quite frequently from airliners flying the corridor, and on one clear day a PanAm pilot saw no fewer than three Migs in the air and 34 on the ground. However, it was ample compensation to receive an invitation to the flight deck from Capt. E. F. Sommers. The A.S.I. showed only 160 m.p.h. and I learned that icing conditions at the cruising height of 7,000ft had reduced our speed by over 30 m.p.h.

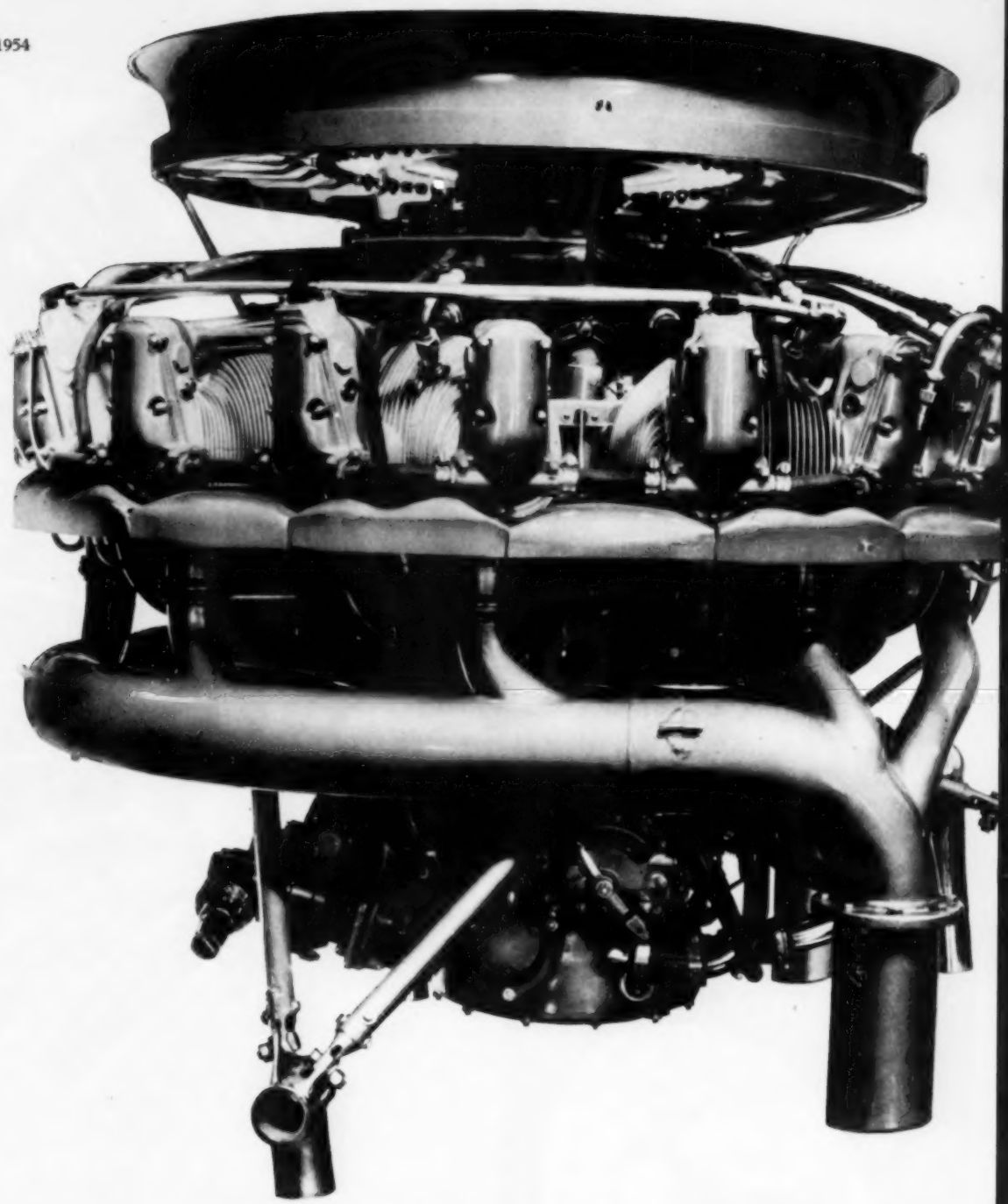
The distance between Rhein-Main and Tempelhof, our destination, was 270 miles, of which 190 were flown over Russian-occupied territory. The width of the corridor is 20 miles and the only vertical limitations are a lower minimum of 5,000ft when flying south-west, and an upper limit of 10,000ft when within a 20-mile radius of Berlin. Both inbound and outbound aircraft keep to the centre-line of the corridor, the only separation being the normal quadrantal-rule clearance of 1,000ft.

Pilots quickly become familiar with the topography of the corridor and in V.F.R. weather find no difficulty in keeping an accurate course by D.R. and map reading. In bad weather, however, full use of radio aids is essential in order to avoid straying into Soviet air-space. The main *en route* facilities are Frankfurt V.O.R., which provides only limited coverage, and the visual-aural ranges at Berlin and Mansbach. Distance checks are made at various points along the corridor with such aids as the Fulda radio range and the localizer of the I.L.S. at Wolfenbuttel.

As we approached the end of the corridor, Clipper *Munich* came under the control of Tempelhof radar, which brought us into position for a long final approach. On this occasion the runway lights were visible at a distance of six miles and the cloud-base was between 1,500 and 2,000ft, but Captain Sommers took advantage of the full talk-down procedure—which is always good practice for controller and pilot alike. During the let-down towards Tempelhof, which is only a few miles from the city centre, I was reminded of Hendon, with its built-up surroundings extending to within a few yards of the perimeter track. As the DC-4 skimmed across the threshold the U.S.A.F. controller signed-off cheerily with "Clipper one-eight-two—you're in the slot."

Although of pre-war vintage, Tempelhof's terminal building remains one of the most impressive in Europe, with its massive cantilever concrete roofing over the apron. Passengers disembark under cover and need walk only a few steps to the stairways leading into the reception rooms. *Munich* remained only about half an hour before taxying out again with another load of passengers taking the lunch-time service to Frankfurt, Stuttgart, Munich and Vienna.

At Tempelhof I was met by Fred Buetenmuller, a former executive of Lufthansa who was the airport commandant during the final stages of the war and is now district traffic and sales manager for PanAm in Berlin. In the course of a lightning tour of the Western sector Herr Buetenmuller outlined for me the story of the refugee airlift. Between 1949 and the summer of 1952, he told me, the monthly influx of refugees from Eastern Germany was at the rate of about 5,000. During the second half of 1952 the flow trebled and over the following six months the average monthly rate soared to 37,000. The peak month was March last year, when 49,000 people made their way towards Berlin and filtered into the Western sector. Facilities for screening and



The Alvis Leonides Helicopter Engine, a 520 b.h.p. 9-cylinder air-cooled radial engine. Weight complete 645 lb. Power/weight ratio 1·24 lb. (0·562 kg.) per b.h.p. Overall diameter 41·5 in. (105 cm.). In quantity production for the Bristol 171 and 173, also in extensive use by the Royal Navy in the Westland Dragonfly.

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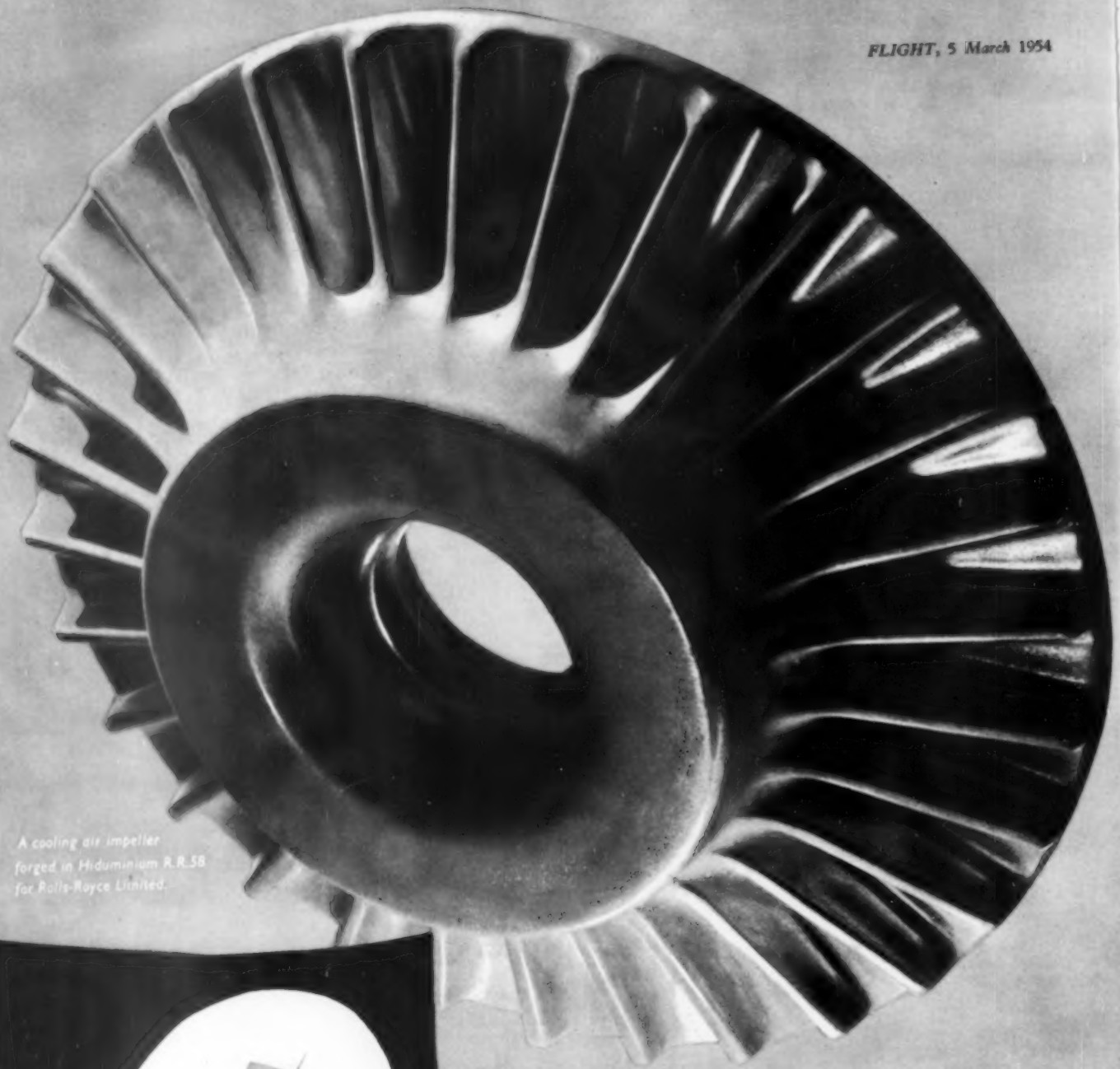

A cooling air impeller forged in Hiduminium R.R.58 for Rolls-Royce Limited.

Whenever British Aircraft take the air

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fly with them

PASSENGER LOG . . .

evacuating the refugees were strained to the limit but by April they were being flown from Berlin to Federal Germany at the rate of 10,000 weekly. The backlog was taken up by May, thanks largely to the extra capacity provided by British independent airlines working in association with B.E.A.

Of the 40,000 flown out in April the British airlines carried about 50 per cent, most of the remainder flying by PanAm and a small percentage with Air France. For six weeks last spring the American airline's transatlantic schedules permitted the use on the airlift of DC-6Bs during their 24-hour stop-over at Frankfurt; this type carried an average of 90 passengers and once flew as many as 103, including children.

The influx from Eastern Germany has declined steadily to less than 10,000 monthly and the number of flights out of Berlin has accordingly been reduced. However, airline opinion is that it would be a mistake to reduce capacity too much because of the difficulty in expanding suddenly in the event of a new exodus.

The "grant-of-refuge" procedure, which normally takes four to six weeks, involves political, criminal and medical screening of all refugees. During this time they are housed in camps, of which there were as many as 52 during the busiest period of 1953.

Single tickets for flights from Berlin to West Germany normally cost slightly more than second-class rail travel, but a special low rate is charged for refugees, whose fares are paid by the Berlin Senate. Since last autumn there has been a further backlog in the evacuation of refugees, caused by unwillingness or inability on the part of the comparatively wealthy states of Northrhine-Westphalia and Baden-Württemburg to accept their full quota of immigrants.

In addition to the refugee traffic there is a great deal of ordinary personal and business travel between Berlin and Western Germany. Last year, for example, PanAm's total passenger lift to and from Berlin totalled 414,000 (an increase of well over 100 per cent on 1952), of whom nearly 109,000 were west-bound refugees.

At Tempelhof I saw evidence of the freight airlift in which British independents have been playing a leading part since 1951 —two Bristol Freighters of Silver City Airways, a Skyways York and a Dakota of Air Charter. Loads carried on the minor airlift vary according to the restrictions placed by the Russians on surface cargo movement. The capacity required is booked a week in advance by the Berlin Senate, which charges shippers the normal surface rate and pays the difference. Traffic was heaviest in March last year when the total amount of freight carried was about 6,000 tons. The lift has since declined by about 50 per cent.

The following day I flew back to Frankfurt, again in bad weather, to keep an appointment with Herr Lange, director of the airport. Rhein-Main has an interesting past and seems assured of an important future. Before the war, in addition to being second only to Berlin as a commercial air traffic centre, it was the focal point of German lighter-than-air development. Its huge airship hangars were demolished in 1940, when Rhein-Main was turned into a Luftwaffe fighter base. In April 1945 the American Air Force moved in and Frankfurt remains a major U.S.A.F. transport base today. Civil use of Rhein-Main was resumed in 1947, and two years later an agreement was signed permitting German administration of the civil side of the airport.

Rhein-Main is administered by a company whose shareholders are the City of Frankfurt, the State of Hesse and the Federal Government. The airport company has virtually a free hand in all civil matters, although pending ratification of the Bonn Convention supervisory powers are retained by the U.S.A.F. and by the Civil Aviation Board of the High Commission.

Passenger traffic at Rhein-Main is now in the region of 1,500,000 people yearly, compared with 80,000 in 1939, and the airport is used regularly by 19 scheduled airlines. Although Berlin sometimes experiences heavier passenger traffic, Frankfurt is supreme as the international air gateway to Western Germany. Herr Lange told me something of the plans made to improve the already excellent facilities which Rhein-Main offers. A new passenger terminal building will replace the one illustrated on page 266, which will be converted into the administrative H.Q. An autobahn link with the Ruhr has already been completed, and it is intended to extend the length of the main runway from 7,000ft to 10,000 although this will mean a costly diversion of high tension power lines. Both G.C.A. and I.L.S. are in operation.

The U.S.A.F. retain responsibility for providing control-tower and approach-lighting facilities. This appears to be a temporary obstacle to the installation of the I.C.A.O.-approved Calvert lighting which is thought desirable by the airport authorities.

Last year the airport incurred a loss of 800,000 marks (£66,000) partly because 42 per cent of the money taken in landing fees must be paid to the U.S. Treasury. In this way funds totalling 1.8 m marks (£150,000) have been collected and "frozen"; Herr Lange hopes that ratification will permit at least part of this amount to be released for development of the airport. In the post-war era of the Marshall Plan, Mutual Aid, N.A.T.O. and other forms of transatlantic assistance, it seems unusual to hear of America taking money out of Europe. The reason is that the Third Reich held shares in Rhein-Main which were automatically confiscated.

In Frankfurt I also met the U.K. member of the Civil Aviation Board of the Control Commission for Germany, G/C. G. W. Johnson, D.S.O., O.B.E., D.F.C., A.F.C. A measure of the degree of independence now possessed by the Federal Government in running aviation ground services is provided by the fact that in five years the British civil air staff has been reduced from 270 to six. G/C. Johnson is now in effect an air attaché, and his office will no doubt be merged with the British Embassy when the Bonn Convention is ratified. British members of the Civil Aviation Board supervise the operation of the three civil airports in the British zone, Hamburg, Hanover and Dusseldorf, but no permanent staff are maintained there. Germany's equivalent of the M.T.C.A. is the Federal Institute of Flight Safety, a branch of Dr. Seebohm's Ministry of Transport. A good deal of the credit for Germany's efficient and early implementation of the I.C.A.O. regional plan for Europe must be given to the groundwork put in by members of the Civil Aviation Board in training personnel and establishing procedures.

The flight back to London aboard Stratocruiser *Constitution* included a traffic stop at Dusseldorf. On the final leg Captain Earl Forrler allowed me to occupy the "jump seat." This was an ideal position to observe the routine of the large crew carried for the transatlantic hop—captain, first officer, navigator (who is also a trained pilot), reserve co-pilot (who also holds a navigator's rating) and two engineers. There is a superb view from the massive flight deck of the Boeing transport. I asked the skipper how he liked flying Stratocruisers. His reply was worth recording: "Man, I hate to see 'em grow old."

Taking off light from Düsseldorf, we unstuck about half-way along the 8,000ft main runway. By the time we were at 100ft the landing gear and flaps were up and at this point the pilot called: "We have a clean airplane." This was a signal for the engineer to inch back the power from Take-off to Rated.

Over Belgium and France the evening air was smooth and clear as we cruised at 260 knots from beacon to beacon, but patches of cloud over the Channel reminded us that London was heavily overcast. There was only a partial glimpse of the brightly lit Manston runway as we crossed the Kent coast and, on instructions from Uxbridge, made our way along Green One to Chatham. By way of Sevenoaks and Epsom the Stratocruiser was brought into position for an I.L.S. approach to runway 28L, monitored by G.C.A.—an ideal combination.

Ahead of us a Constellation missed its approach and requested clearance to divert to Hurn, which sounded discouraging. London reported a cloud-base of 250ft and runway visual range of half a mile—which corresponded almost exactly to the PanAm minima for this combination of aircraft and airport. Incidentally, these minima (200ft, 880 yd) are a fine tribute to the excellence of the control facilities, lighting and runways at L.A.P.

"On the glide path, heading good . . ." Captain Forrler concentrated on his I.L.S. pointers and the clear, crisp directions coming through his headset. The first officer looked ahead, and behind them a third pilot fixed his gaze on the altimeter, ready to call for an overshoot in case we reached 200ft without sighting the ground. Just as the needle showed 250ft we emerged, almost above the gleaming amber cross-bars and in that critical moment the whole process was transformed—from what felt like a headlong descent down a dark pit into a perfectly controlled night landing. Within seconds, thanks to Mr. Calvert and the teamwork of pilots and controllers, the Stratocruiser was safely down.

FRANK WOOTTON'S PAINTINGS

THE feature *Aeronautical Artist*, dealing with the work of Frank Wootton and published in *Flight* of February 5th, produced correspondence from readers as far afield as Copenhagen and Moscow. Most of the letters asked whether it was still possible to obtain reproductions of Wootton's war-time paintings. The answer is provided by Mr. R. A. Loader, a director of Samson Clark and Co., Ltd., of 57-61 Mortimer Street, London, W.1, who writes as follows:—

". . . during the war years Frank Wootton made a large number of paintings to the commission of the de Havilland Aircraft Co., Ltd., which, with their permission, we were able to reproduce for sale as individual prints on behalf of the Royal Air Force Benevolent Fund. Looking up my records, I find that as a result of these sales the Benevolent Fund benefited to the extent of almost £5,000.

"Some of the ten subjects are completely out of print, but I find that there are, in all, about 200 prints of the following subjects:—

"Night Work (Hurricanes); A Job of Work to be Done (Defiants); Looking for Trouble (Spitfires); Convoy Patrol (Sunderlands); Trainer of the Empire (Tiger Moth); Low Attack (Mosquitoes); and Mosquitoes Sting at Night.

"These are still available in the form of artist-signed proofs [17in × 12½in on 25½in × 20½in white mounts] at £3 3s each . . . The full amount of subscription, less only the cost of packing and postage, would be forwarded to the very deserving cause which, as you may gather, is very close to Wootton's own heart."

GAS TURBINE MANUFACTURE

Aviation Examples in Production Engineers' Lecture at Derby

THE relative advantages of the gas turbine engine and problems encountered in its design and manufacture were described by Mr. Frank Nixon (assistant general manager, Rolls-Royce, Ltd., Derby) in a lecture given before the Derby branch of the Institution of Production Engineers on December 14th last. Entitled *The Effective Utilization of Material*, the paper dealt with some of the factors influencing the success with which available supplies of material could be converted by manufacturing labour, skills and equipment into products commanding ready sales. The influence of the various factors on this effective utilization was illustrated by examples taken mostly from the aircraft gas turbine engine, and the main points from Mr. Nixon's paper are summarized below.

Giving first some typical values of material utilization (the proportion of original material which is present in the finished product), Mr. Nixon quoted figures of 97 per cent for wire cable, compared with 10 per cent in cases where a large amount of machining was necessary. Machinery, comprising an assembly of a number of detailed components, usually had an overall material utilization varying from about 40 per cent for an aircraft engine to over 60 per cent for mass-produced domestic equipment. A high figure, however, did not necessarily signify an efficient product.

The most important factor which influenced the overall value of the product to the customer was that of design, both fundamental and detail. The gas turbine provided a striking example of the influence of fundamental design, producing power for between one-third and one-seventh the weight of the lightest equivalent power unit.

The Avon Mk 1 engine had a static sea level thrust rating of 6,500 to 7,500 lb and weighed 2,710 lb complete with jet-pipe. To propel the Comet 2 through the air at its cruising speed of 500 m.p.h. at 40,000ft required about 10,000 h.p., or 2,500 from each Avon. It was obvious that the Avon engine was making far better use of its material than the highly supercharged Merlin 724 piston engine which, complete with accessories, weighed 3,600 lb and delivered some 450 h.p. at 40,000ft (or 360 h.p. assuming 80 per cent airscrew efficiency)—although admittedly not designed for this height.

Within the bounds laid down by the basic design, the designer was able to exert a considerable influence upon the product by means of detail design. These detail considerations had an important bearing upon the way in which the material was used, and they included the effects of the purpose and function of the product, performance, cost, weight, appearance, ultimate life, running cost, overhaul cost, scale of production, availability of materials and manufacturing facilities available. The relative importance of these factors varied enormously with the type of product; for example, a casting left rough would give a higher material utilization figure than a part which was machined all over, but if it entailed lower safe working stresses and increased weight, the net result might be worse.

In order to obtain the highest performance with minimum weight, the aircraft engine designer worked his engine at the highest temperatures feasible with the available materials, and he worked those materials at the highest possible stresses. Although this could mean expensive special alloys, and an apparently excessive amount of machining, the result was that the prime cost per brake horsepower was appreciably lower than that for other types of engine. This was due partly to the quantities produced, but largely to the fact that the increased cost of material and of machining were more than compensated by the increased amount of work done by the material. Again comparing the Merlin 724 and the Avon 1, the average cost per pound of the raw materials used for the Avon was roughly double that for the Merlin, although the overall material utilization figures were about the same. The manufacturing manhours per pound were much higher for the Avon, due to the difficult shapes and difficult materials employed, and yet the cost per continuous horsepower was roughly half that of the Merlin under equivalent conditions.

Other considerations in detail design were those of the proportion of expensive or rare materials used, the reduction of the number of different parts, and the reduction of wasteful modifications.

The development department, also, had an important part to play, for its engineers had to test the product to discover its weaknesses and, by eliminating them, increase its availability, its life, and its specific performance. Work which was going on all the time on the performance of compressors and turbines, and on combustion efficiency, for example, had a considerable effect on the economy and specific performance of an engine, usually for a negligible difference in material weight.

Development was responsible for raising the overhaul life of the civil Merlin 724 engine from 600 hours to 1,250 hours for a weight increase of only 70 lb, and only a small increase in cost. Another good example of development was in the field of Nimonic alloys for turbine blades (see Table I).

TABLE I: DEVELOPMENTS IN NIMONIC HEAT-RESISTING ALLOYS

Alloy	Temperature for fracture in 100 hours at X tons/sq in	Corresponding increase in thermal efficiency	Corresponding increase in thrust per lb of air consumed
80A	880 C	—	—
90	910 C	2.6 per cent	8 per cent
95	940 C	4 per cent	16 per cent

Research, also, was important although at present there existed some misunderstanding as to its true meaning and function. Research work on fatigue over the past 100 years had resulted in the designer being able to work with a more accurate knowledge of stresses, and hence with a lower factor of safety, with consequent lightening of structures and an enormous saving in material. Concurrently, much work had been done by applied mathematicians and engineers on the problem of the vibrations of structures, including flutter of aircraft wings and the vibration of gas turbine compressor blades.

In the metallurgical field it was perhaps more apparent how much was owed to research; the new Titanium would obviously be taking its place in engines at an early date. Also well to the fore at present was the applied research on machining. As the metallurgist introduced tougher materials to meet the increasing demands of the designer, the machine shop was provided with better tools and better methods. Examples were carbide cutters, high-speed machining, hot machining, better lubricants, better cooling by CO_2 and strong jets of direct coolant, and machining by electric spark, spark-anodic and ultrasonic methods.

The section of primary interest to the production engineer was that of manufacture. Every aspect of production management and engineering was concerned, and while these could not have the same influence upon material utilization as design, they played a very big part in the ultimate cost of the product. For example, the high performance, light weight and reliability of the Avon were due mainly to the efforts of the design, development and research departments, but the relatively low cost was mainly due to the manufacturing side.

The rate and scale of production was the first manufacturing problem. The choice of machinery and methods, and the type of tooling must be properly matched to the scale of production; and special techniques, developed to meet the needs of mass-production in other industries, should not necessarily be copied.

The greater part of British industry was in fact not employed on mass-production. This gave flexibility and had an important effect upon material utilization in minimizing scrap and wasted effort due to modifications. For instance, in the case of large bomber aircraft during the war, the productive manhours per pound of aircraft were almost identical for similar British and American machines. As modifications became necessary, however, they were introduced quickly and smoothly into the British aircraft without interrupting the production flow or reducing the output, whereas in the U.S.A. the planned mass-production lines were so rigid that the production of obsolete aircraft, subsequently sent to modification centres, had to continue.

The planning and tooling engineer always had to pay careful regard to the probable stability of the design. The rapid multiplying of engine types in current production and the continuous changing of a design, coupled with the scale of production, made the manufacture of aircraft engines more a matter of large-scale jobbing than of mass-production—another reason for flexible and adaptable methods of manufacture.

Since the highest possible performance must be obtained from every component of the aircraft engine, the most suitable choice of manufacturing method, e.g., forging, casting, or fabrication, must be employed. In an aircraft engine were generally found together forgings and drop stampings, in high-tensile and in high-temperature alloy steels, machined all over; precision die-forged blades in a wide variety of metals, machined only on the roots; sand-castings, die-castings, centri-castings, centri-spinnings, shell-mouldings and precision castings in light alloy, iron, steel and

TABLE II: TYPICAL FLAME-TUBE: BREAKDOWN OF COSTS

Cost item	Per cent of total cost
1. Raw material	45.5
2. Pressing, forming and shaping	6.7
3. De-burring, radiusing and flash removal	14.2
4. Preparation for welding, i.e. cleaning, jigging and tacking	9.0
5. Welding and brazing	8.3
6. Machining	12.0
7. Miscellaneous handwork, etc.	4.3
	100.0

high-temperature alloys; hot extrusions, impact extrusions, pressings, spinnings and fabrications in light alloy, alloy steel, stainless steel and high-temperature alloys; brazings by torch, salt-bath, induction and furnace in a variety of alloys; weldments by arc, shielded inert-gas metallic arc, torch, spot, stitch, steam and flash butt. The task of the production engineer was to ensure that each process was employed efficiently, in the right application and on the appropriate scale.

The need for absolute reliability in the highly stressed moving parts of the aircraft engine had meant that crankshafts, connecting rods, pistons, valves and gears had for many years been machined from forgings, whatever the type of engine. The chief influence of the aircraft engine industry here had been in its insistence upon absolute cleanliness of the metal, accurately controlled forging to give the most appropriate grain flow, and the development of metals of ever-increasing strength.

The gas turbine engine had forged shafts and turbine and compressor discs which followed orthodox lines. In the axial engine, the turbine and compressor blades presented special problems due to their shape and the metals from which they were made. The difficulties of producing accurately thin aerofoil sections having varying degrees of camber and twist (according to the increasing experience of design and performance) in light alloys, stainless steels and high-temperature alloys, had led to a number of different solutions. It was the author's opinion, however, that precision forging of the aerofoil would always play a big part.

Intrinsically, the casting method should give the cheapest metallic shapes, since moulding enabled almost any form to be produced, and the scrap metal was returned directly to the furnace. In the case of the aircraft engine, in the larger sizes of static parts castings could not always be produced to the dimensional accuracy and thinness which was dictated by the need for lightness. They found their widest application, therefore, in light alloy static casings, where the effect of dimensional errors was not so great; in iron castings which could be machined all over; and in precision castings in high-temperature alloys for smaller static parts, such as nozzle guide vanes.

The argument usually adduced against castings was that they were unreliable because of possible inclusions, porosity due to shrinkage and gas, coarse structure, hard and brittle spots, shrinkage cracks, and similar defects. By systematic attack upon the basic causes of these defects, however, considerable advances were being made.

Fabricated sheet metal parts occupied an important place in the aircraft gas turbine engine for flame tubes, discharge nozzles, air casings, exhaust units and jet-pipes. Material utilizations as high as 56 per cent were obtained with flame tubes, and they played a big part in the low specific weight of the gas turbine.

The flame tube was made from light-gauge Nimonic sheet, and since the efficiency of combustion and the life of the flame tube itself depended upon the accurate guiding and metering of a stream of air flowing through it at about 20 tons per hour, along carefully pre-determined paths, it must be made extremely accurately. As large quantities were not required, compared with what was usual in the precision sheet-metal field, and since the material was extremely difficult to form, new problems of tooling and manufacture had been presented. The sub-division of the costs of material and the various manufacturing operations was revealing, and showed the relative importance of machining, locating, welding and finishing (see Table II above).

The biggest drawback of fabricated construction was the multiplicity of constituent components as it affected machining, locating and welding. The cost of tooling would be roughly proportional to the number of constituent components. Where a complex casting was replaced by a composite fabrication, there would generally be an increase in cost, although in special cases fabrication might prove cheaper.

It was, perhaps, not generally realized how great was the influence of efficient shop management and planning on the ultimate cost of an article. A study of the costs of a number of components produced by similar methods and at comparable rates by various firms had shown much variation.

Among the differences were found in one case a metal utilization of 41 per cent, compared with 55 per cent in the best case, and accounting for £4 in the cost of a £20 component; in another, a rejection rate double that of the best case, due to the unexpected effect of an "economy" measure; in another, an excessive amount of corrective work, which was eliminated by a simple change of method; and in yet another, excessive scrap due to inefficient inspection. Differences in incentive methods and in effective shop loading had a large influence upon manufacturing times, so much so that differences of 100 per cent had applied to identical components made by identical methods.

With three-quarters or more of the original ingot metal being discarded as croppings, metal loss, machinings or spoilt work, there was a fruitful field for recovery. It was noteworthy that the machining scrap of high alloy, heat-resisting steels could be reclaimed most economically, and even the highly critical Nimonic alloys could now be reproduced safely from their machining scrap. This was indeed an achievement, for the slightest trace of adulterant, such as lead, could completely ruin a melt. The lack of a recovery method for Titanium was one of the big factors in the high cost of this metal.

Repair and maintenance was another important factor. Aircraft engines, because of their inherently high duty, were usually given short overhaul lives when they were first introduced into service. At the expiry of the specified time, the engines were withdrawn for a complete overhaul which restored them to their full original effectiveness and reliability for a fraction of their prime cost. The constant aim was to increase the overhaul life and to reduce the cost of parts needing replacement.

In civil aviation, planned maintenance was carried out on scientific lines. Although the aircraft engine might seem to have a relatively short life between overhauls, the time it was out of commission and the overhaul cost were small. Taking everything into account, the cost per horsepower hour of the aircraft engine compared favourably with that of any other engine in its power class. Rolls-Royce were now overhauling their civil engines on a guaranteed "cost per flying hour" basis, which means that the operator knew just how much his power was costing him for as long as he wished to keep the engine in service.

By no means least in the integrated influences on effective utilization were the parts played by the sales and service departments. In the final analysis, both played as vital a part as any in ensuring that the work of designers, production engineers and others could be put to effective use.

In conclusion, the inference to be drawn was that there was no simple general rule for good product engineering, and effective utilization of metal. Success could only be achieved by making a thorough study of all the factors involved in each case, and in particular by marshalling to best advantage all the talents, skills and techniques available in the organization concerned.

Although such studies could lead to widely differing conclusions in different cases, they had one thing in common. This was the great part played by commonsense and by the straightforward down-to-earth approach. Striking improvements might be made by relatively simple changes, and it was important to realize that many of the problems were not new, but were of types which had faced engineers since the days of pre-history.

"By directing our thinking," Mr. Nixon ended, "more along these simple, straightforward lines, we shall be able to bring about a much earlier realization of improvements in that field which is described by that blessed but much-abused and often-misunderstood word, productivity."

TEST-FLYING ACCIDENTS

WE regret to record the deaths of two test pilots, and a flight observer, in accidents last week.

On Monday, February 22nd, Kenneth Burton Forbes, of the Fairey Aviation Co., Ltd., lost his life in a Venom near Cheadle, Staffs. He was on a flight from Ringway, where Faireys assemble Venoms.

Born in 1920, Forbes joined the R.A.F. in January, 1941, was trained in the U.S.A., and later flew Spitfires, mainly on P.R. duties, for which he was awarded the D.F.M. In 1944-45 he was on ferry work. After the war he was with B.E.A., and subsequently with Sivewright Airways. He joined Faireys, as assistant to David Masters, senior test pilot at Ringway, in April 1951. He leaves a widow and a son.

On Thursday, the 25th, one of the Canberras built by Handley Page, Ltd., crashed on the railway embankment near the company's airfield at Radlett. It was being test-flown by F/L. Kenneth William Dalton-Golding, D.F.C., aged 33, who joined the firm as assistant experimental test pilot in July 1952 on completing a distinguished Service career dating from 1941. He had served operationally in Coastal Command and in Malaya; in 1951 he completed an E.T.P.S. course and served at Boscombe Down as a test pilot. In 1951 he received the King's Commendation for Valuable Service in the Air and was Mentioned in Despatches for his work in Malaya. F/L. Dalton-Golding leaves a widow and two sons.

Also killed in the Radlett accident was 21-year-old Michael George Goodridge, who had been a Handley Page flight observer for just over a year.

R.Ae.C. Gold Medallists

No fewer than three R.Ae.C. Gold Medals were presented for 1953. *Receiving them from Lord Brabazon, at the dinner given in their honour, are Neville Duke, Walter Gibb and Mike Lithgow (who also received the de Havilland Trophy).*

AN enjoyable and stimulating dinner was given by the Royal Aero Club on Wednesday, February 24th, in honour of W/C. Walter F. Gibb, D.S.O., D.F.C., S/L. Neville F. Duke, D.S.O., O.B.E., D.F.C., A.F.C., and Lt. Cdr. Michael J. Lithgow, to whom were presented Royal Aero Club Gold Medals. That the occasion was an informal one in no way detracted from its importance—nor from the esteem in which the recipients (and those distinguished few who have received Gold Medals in the past) are held.

Lord Brabazon, president of the Club, briefly introduced the guests of honour, saying that R.Ae.C. Gold Medals were not easily won nor easily given. He recalled some of the earlier recipients from the first—the Wright brothers—and said that on this occasion "two fast young men and one climber" were to be honoured.

The achievements of the three were then read out by Col. Preston, the secretary-general. W/C. Gibb captured the world height record in the Olympus-Canberra, in which he achieved an altitude of 63,668ft; S/L. Duke broke the world speed record at Littlehampton in a Hawker Hunter with Rolls-Royce Avon RA.7R engine, attaining 727.6 m.p.h., and shortly afterwards he broke the 100-km closed-circuit record, in the same aircraft, with a speed of 709.2 m.p.h.; Lt. Cdr. Lithgow later broke the speed record in a Supermarine Swift, also with Rolls-Royce Avon R.A.7R, his speed being 735.7 m.p.h. on a course over the Libyan desert. This was the highest speed achieved by a British pilot during the year, and he therefore received, in addition to his Gold Medal, the Geoffrey de Havilland Trophy.

After the presentations the three recipients each made an excellent brief speech. W/C. Gibb noted that Mr. Cyril Uwins and Mr. John Cunningham were present at the dinner, and it was thus more true to say that there were "three height gentlemen and two speed ones." By request, he then recalled his impressions during the record flight. He said it was very dark above and very light below. He believed that Lord Brabazon's speed down the Cresta Run was about 40 m.p.h.; his had been a little faster, for he had come down from 12 miles high in 12 minutes. This was not difficult on a modern jet aircraft if one shut both motors!

W/C. Gibb mentioned that Mr. Piper, his observer, although he was not carried on the record flight, had been on every other flight in the Olympus-Canberra trials and had accompanied him on occasions at above 60,000ft.

S/L. Duke said he did not presume to list himself with the earlier recipients of Gold Medals, but he felt that he was in the same book, so to speak. He thought that records were a good thing as indicating the measure of achievement. He would like to see the Littlehampton course kept open. British records seemed to come late in the year, and to go really fast one needed high temperatures; but one could still go fast at Littlehampton, and there was no reason why the speed of sound should not be achieved at the heights and conditions at present laid down for speed records. A lot was now known about control at sonic speed. S/L. Duke paid a tribute to those who decided whether to go to the tremendous trouble and expense of attempting to break a record. It was no easy decision.

Lt. Cdr. Lithgow added a second correction to the earlier speeches, pointing out that Mr. Eric Greenwood was also present at the dinner, and thus there were "three speed gentlemen and three climbers." Replying to S/L. Duke's "dig" about his record and the heat in Libya, he caused laughter by saying he had expected to have company in Africa but he supposed the cost of freighting an aircraft to Libya would be very high.

AIRBORNE NEON IN THE NIGHT SKY

ON Wednesday evening of last week, people in London—particularly in the southern districts—were surprised to see, in bright green block letters in the sky, an injunction to sample a certain popular beverage. In fact, the lettering was carried on the wings of a Rapide belonging to Sky Neon Aviation, Ltd., of Croydon Airport, who were starting their new advertising service. Previously some 40 hours' work had been done over Lancashire and Yorkshire. The company have two Rapides, G-AHKV (illustrated here) and -GB. Some experiments had been made with smaller aircraft, but they were not found suitable for the company's work.

It takes about 48 hours to set up a sign on the supporting frames under the wings; these frames were made by Redwing, Ltd., while Willis Hole, Ltd., fabricated the mounting brackets. Franco Signs, Ltd., were responsible for the complete neon installation. The power requirements, from two Exide 12 V 100 a.h. batteries, are 24V 100 amp, stepped up to 4-5,000 V.

The aircraft carries Murphy MR80 radio, S.B.A. and M/F. range. Normal duration of a sortie is 2 hr 45 min. Operation is at a minimum height of 1,000ft, the pilot flying on QFEs from the controlling airfield.

The chairman of the Sky Neon company is Mr. D. H. Glover, who is assisted by Messrs. R. J. H. McNeill, T. T. Munns and H. Law, with Major P. B. Lowe as business manager. The operations manager, who is also a pilot, is Mr. C. Treen, and the company's other two pilots are Mr. P. F. Gurdon and Mr. W. Steel.

Sky Neon in action: (Left to right) W. Steel and P. F. Gurdon, pilots; H. Law, aviation director; and C. Treen, operations manager and pilot.

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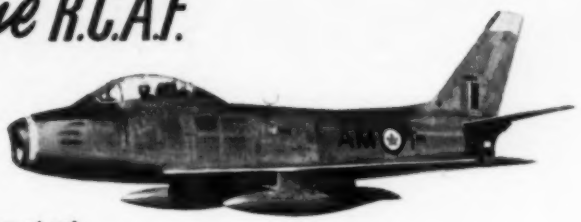

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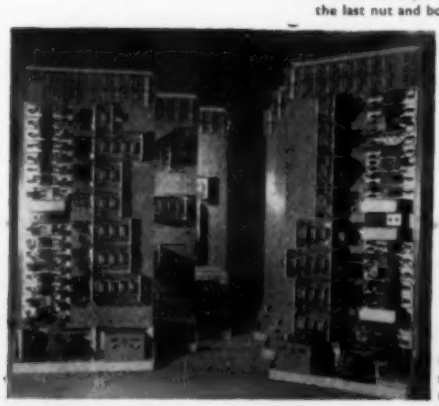

Brain of the simulator. These computors solve the equations which express the movement of the aircraft in flight.

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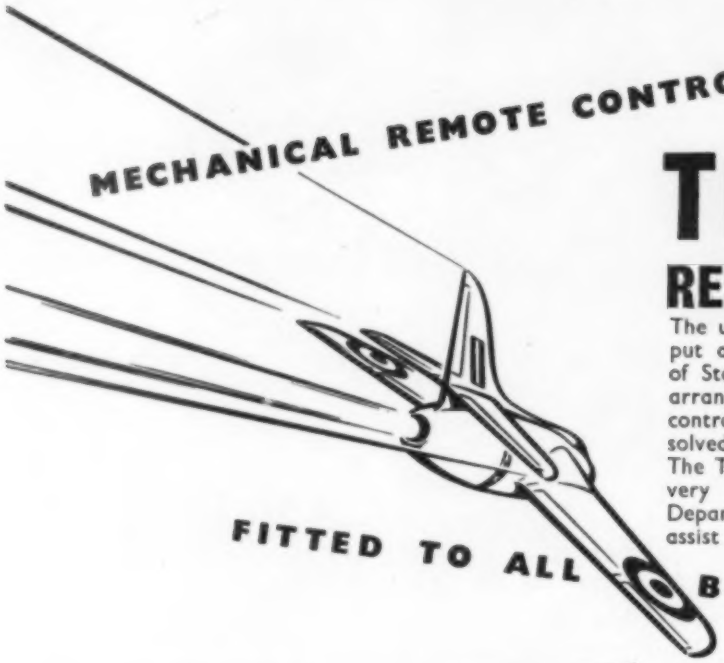

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CORRESPONDENCE

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The Sopwith Pup

THE recent correspondence on the ancestry of the Sopwith Pup has been of great interest, but I feel that in this day and age there is perhaps a danger of "over-organizing" the results of what were largely spontaneous and unprogrammed activities forty years ago.

The interpretation of the mysterious designation "SL.T.BP" is a case in point; to my mind, it is entirely probable that Hawker's "Runabout" would have been called the "small tractor biplane"; on paper this would be contracted to "Sl.T.B/P" and duly elevated to the "upper case" as "SL.T.BP" by a tracer or draughtsman, whose record would eventually become the authority for engraving the mandatory civil aircraft name-plate.

The same reasoning can be applied to the "Egg-box" triplane, which my records show as "L.T.Tr," i.e., "Large Tractor Triplane." Unless there is more supporting evidence there does not seem to be any justification for adducing the designations "Type P" and "Type T" for these two aircraft. In the same way "S PG N" could have meant "Seaplane Pusher Gun-carrying Navyplane."

The later Sopwith designations listed by Mr. Brooks (February 19) are mostly well authenticated by records and titles or original Sopwith photographs, but I would dispute two of them. Photographs of the Salamander give the designation "TF.2" for this type, "TF.1" being allocated to a Camel trench-fighter variant.

I agree that "TF.2" for the Buffalo is a logical deduction, but it does not agree with the records. Secondly, I suggest that "STI.2" means "Small Tourer 1 or 2 seater," since the Dove was also built in single-seat form, and the corresponding "Large Tourer" would be the Gnu.

Perhaps someone with first-hand Sopwith experience (e.g., Mr. W. G. Carter or Mr. Frank Buckell) might care to comment.

Hambrook, nr. Bristol. SENRAB.

—and the S.E.5

A WORD of appreciation for the excellent articles by J. M. Bruce, on Historic Military Aircraft.

There has been much controversy over the serial number of Capt. McCudden's favourite S.E.5, so I venture to quote the following extracts from McCudden's diary:

His first S.E.5 on joining No. 56 Sqn.: "The machine was No. B/519, a Vickers-built S.E.5."

His second S.E.5: "Lt. Sloley went to St. Omer for me, to get another machine and brought back a factory-built [Royal Aircraft Factory] S.E.5, No. A/4863."

His third S.E.5: "My new machine was a Martinsyde-built machine, No. B.35, and it was very fast."

His fourth and favourite S.E.5: "On the 3rd December a new factory-built S.E.5 came to my Flight and I at once took it over. I gave my Martinsyde-built S.E. to the youngest member of the Flight, for it was a very good one.

"My new S.E. was numbered A/4891 and was fitted with elevators with a narrow chord. It also had a new type of undercarriage, which was much stronger than the others."

I would like to add that McCudden also flew the Sopwith Pup for a short period in France, before joining No. 56 Sqn.

He likewise flew the Pup, as a fighting instructor, whilst on rest period in England. He makes numerous references to this in his diary. This particular machine had a Lewis gun fitted to the top plane, but had no Vickers firing forward.

Sittingbourne, Kent. H. J. GOODWIN (ex-R.A.F.).

Production—British and American

IF C.P.B. of Canada (p.176, February 12th) is a fair example of transatlantic psychology I don't think much of it! I doubt if any of his five points are worth making except perhaps (5). The facts are, surely, these:—

(1) The present fighter equipment of the R.A.F. is due to a policy decision taken at least eight years ago and so has no bearing on the point in question—and, anyway, the Venom at 40,000ft has fire-power equal to the Sabre and manœuvrability equal to the Mig-15. The Super Sabre has only flown as a first prototype and is probably not as advanced in production as the G.A.5 of similar calibre; also, an RA14R engine might bring a Hunter or Swift into the same class. Your correspondent should not confuse advanced production with advanced publicity (if he wants an example of that near home, let him see what was said and what was actually done on CF-100 production).

(2) Bombers were subject to the same policy decision as fighters.

(3) Until recently the J57 was cleared for only 8,800lb thrust and the 10,000lb-thrust version is, I'm sure, no more advanced in production than the RA.14 and Olympus of higher thrust and lower weight.

(4) We are developing some very advanced helicopters and a little pre-Comet-type transatlantic complacency is just what we need to put us in front in a few years' time.

(5) We could probably use some high-speed pure-research machines; but the American rocket planes were designed for jets which did not turn up, and so the makers had to turn to rockets. The X-3, for the latest instance, is held up because the J46 is N.B.G. and the J57 is too big and too heavy.

If the Americans *have* narrowed the gap it is by their own exertions and not by our default.

Leicester. B. A. MURPHY.

[This is a heartening point of view, but not all of our correspondent's statements are accurate. Production of the F-100A is already considerable; although the type is not yet cleared for service, large numbers should be at work this year. Production of the CF-100 is now well up in the hundreds, and is a fine effort by the youthful Canadian industry. Production of the J57, too, is on a vast scale by any standards.—Ed.]

Heliports: Setting a Good Example

I HAVE read with great interest your report of discussions at the Helicopter Association's "Brains Trust" as to the future expansion for civil purposes of helicopter services. In the issue of your journal of February 5th I noted with particular interest the observations on the advantage in relation to town planning of reserving adequate space for future helicopter landing grounds.

It will no doubt be of interest to your readers to learn that in planning the business centre of the new town of Glenrothes in Fife, situated midway between the Firth of Forth and the Firth of Tay, a landing ground for helicopters has been zoned by the Glenrothes Development Corporation. Situated within the eastern area of the Fife coalfields presently being developed by the National Coal Board, it was felt that it would be prudent to reserve from the start adequate ground space in view of the continuous development in aviation and helicopter design.

Glenrothes, Fife. FRANK A. B. PRESTON.
Gen. Mgr., Glenrothes Development Corporation.

FORTHCOMING EVENTS

Mar. 5. Helicopter Association: "The Design of the Drive," by J. L. Norton.
Mar. 5. Avro 504 Club: annual dinner, Londonderry House.
Mar. 5. Photogrammetric Society: "Soil Survey" lectures by Dr. Alex Muir and J. Callow.
Mar. 6. British Interplanetary Society: "Design of a Life Compartment Necessary for Space Travel," by N. R. Nicoll.
Mar. 10. R.Ae.S.: 7th Louis Blériot Lecture (in Paris): "The Domain of the Helicopter," by R. Hafner, A.F.R.Ae.S.
Mar. 10. R.Ae.S. Graduates' and Students' Section: Annual general meeting, and film show.
Mar. 12. Royal Institution: "The Search for Lightness," by Hayne Constant, C.B.E., F.R.S., F.R.Ae.S.
Mar 13. R.Ae.C.: World Gliding Championship Appeal Ball, Londonderry House.
Mar. 13. British Interplanetary Society (Midlands Branch): "Establishment of the Lunar Base," by R. A. Smith.
Mar. 13. British Interplanetary Society (Provisional Yorkshire Branch): "Man in Space," by H. S. Peiser.
Mar. 16. R.Ae.S. Section Lecture: "Development of the Spill Flow Burner and its Control System for Gas Turbines," by F. H. Carey, A.F.R.Ae.S.
Mar. 20. British Interplanetary Society (North-West Branch): Short-paper evening by members of the branch.
Mar. 24. R.Ae.C.: Annual general meeting.
Mar. 25. R.Ae.S. Graduates' and Students' Section: "Airworthiness Requirements for Landing and Take-Off," by L. J. W. Hall, Grad.R.Ae.S.

R.Ae.S. Branch Fixtures (to Mar. 26).—Mar. 8, *Glasgow*, "Aircraft Design," by R. L. Lickley; *Halton*, "Fatigue: What it is and Some Ways of Reducing its Incidence," by Major P. L. Teed; *Henlow*, "Bird Flight," by Capt. J. L. Pritchard. Mar. 9, *Belfast*, "Guided Weapons," by M. B. Morgan. Mar. 10, *Southampton*, "The Design of Target Aircraft," by R. J. B. Woodhams.

Mar. 15, *Derby*, Social function. Mar. 17, *Hatfield*, "Integral Construction," by E. D. Keen; *Preston*, "Aircraft Production General," by F. H. E. Maidment; *Weybridge*, "Operating Viscounts," by Capt. A. S. Johnson. *Manchester*, "Sandwich Construction Applied to Aircraft Structure," by W. G. Heath. March 18, *I.O.W.*, branch prize lectures.

Mar. 22, *Halton*, Junior members' night; *Henlow*, student members' lectures. Mar. 23, *Belfast*, "Aspects of Resistance Strain-Gauging," by G. A. Lewis. Mar. 24, *Bristol*, joint meeting with Inst. Prod. Engineers—lecturer, Walter C. Puckey; *Luton*, annual general meeting and presidential address. Mar. 26, *Birmingham*, "Delta Aircraft."

THE INDUSTRY

Prizes for Belfast Apprentices

MORE than 130 apprentices of Short Bros. and Harland, Ltd., received scholarships, certificates or awards at the annual apprentice prize day held recently at the company's main factory at Queen's Island, Belfast. The event was attended by over 1,200 apprentices, parents and friends and the prizes were presented by Lady MacDermott, wife of the Lord Chief Justice of Northern Ireland. Presenting his annual report, the Apprentice Supervisor, Mr. F. C. Kirkpatrick, said there had been 1,500 applications for the 200 vacancies at the school last year.

Aircraft built by the company were on display outside the main workshops and the Seamew was flown in an impressive demonstration by S/L. W. J. Runciman.

During the year 120 pupils took courses of not less than thirteen weeks at the apprentice training school. The facilities are now being extended to accommodate 60 apprentices at a time, thereby making it possible to send boys back for refresher courses.

BELFAST APPRENTICE T. J. Black receives his award—the Whitworth Prize—from Lady MacDermott, wife of the Lord Chief Justice of Northern Ireland. *(See "Prizes for Belfast Apprentices," this page.)*

Precision Speed Indicator

IN the wide range of equipment produced by the British Thomson-Houston Co., Ltd., of Coventry, is the Maxwell precision speed indicator. This is an instrument originally developed to provide accurate rotation speed measurements for the early Whittle gas turbines, which were made by B.T-H. Whereas, it is stated, existing mechanical indicators were unable to deal with the high r.p.m. involved, the Maxwell instrument proved to be capable of measurements accurate to 0.1 per cent. The indicators are now produced for 12 speed ranges, between zero and 1,000 r.p.m., and zero and 48,000 r.p.m.

The B.T-H. Maxwell indicator.

The instrument is essentially a frequency meter working on the basic principle of the Wheatstone bridge. One arm of the bridge circuit is replaced by a special high-accuracy mica capacitor having a nominal value of 0.15 microfarads. This is charged and discharged through a quick-acting relay, the number of charges per second being dependent on the frequency transmitted from a generator coupled to the machine whose speed is to be measured. The generator frequency may be as high as 250 c.p.s, and the circuit components are so arranged that the capacitor becomes fully charged; thus, the mean strength of the signal passed on to the measuring circuit in any given small period of time is proportional to the frequency of the generator, or to the speed of the machine driving the generator.

Instruments are normally supplied with four sensitive ranges for speed measurements, arranged to divide equally the total speed range covered. To allow for voltage variations in the small battery required for operation, and also to facilitate accurate speed measurements, the instrument can be zeroed simply and quickly either during or before operation. Thus, the accuracy of the readings can be frequently checked.

The instrument itself measures 14½in by 8in by 12½in. Two radio-type grid-bias batteries of 9 volts each are used. The transmitting generator to be fitted to the machine under test is supplied fitted either with a coupling or with a splined shaft as required. It is stated that the instrument is easy to service and that its accuracy can be maintained indefinitely.

IN BRIEF

English Electric group profit for 1953 (to December 26th) was £4,779,920 (1952, £4,359,034). After deduction of all charges, including taxation, these figures are £1,553,897 and £1,449,518.

* * *

D. Napier and Son, Ltd., report a 1953 profit (to December 26th) of £265,012. After deduction of charges and taxation the figure becomes £111,012, as against £98,436 in 1952.

* * *

Mr. B. H. Dulanty has been appointed chairman of Silentbloc, Ltd., in succession to Mr. H. Vezey Strong.

* * *

Mr. Robert Appleby, who joined Black and Decker, Ltd., of Harmondsworth, Middlesex, a year ago, has been appointed a director and general manager of the company.

* * *

Mr. A. E. Griffin, formerly of Specialloid, Ltd., has joined the staff of Exactor, Ltd., London, as general sales manager. He succeeds Mr. H. I. Arnold, who has been appointed sales director.

* * *

Mr. John E. Markes has been appointed managing director of Bowden (Engineers), Ltd., in succession to Lt. Col. H. G. Gilchrist, who has retired from active business. Mr. Markes and Mr. W. A. Melsom have been elected to the Board of Bowden (Holdings), Ltd., the parent company.

* * *

Recent issues of technical publications by Henry Wiggin and Co., Ltd., Birmingham 16—always a model of what such literature should be—include *Notes on the Annealing and Pickling of Nimonic 75 and Nimonic F; Spheroidal Graphite Cast Iron (Properties and Applications);* and *Nickel Alloy Spring Materials.* Also published is a brochure entitled *Nimonic Alloys in Gas Turbines;* it includes a four-colour gas-flow diagram illustrating temperatures through a Derwent 5.

* * *

Northern Aluminium Co., Ltd., announce that the telephone number of their Leeds area sales office is now Leeds 33621.

* * *

From A. E. Cawkell, electronic engineers, of 6-7 Victory Arcade, The Broadway, Southall, Middlesex, comes a brochure illustrating their latest special-purpose pulse equipment and oscilloscopes.

* * *

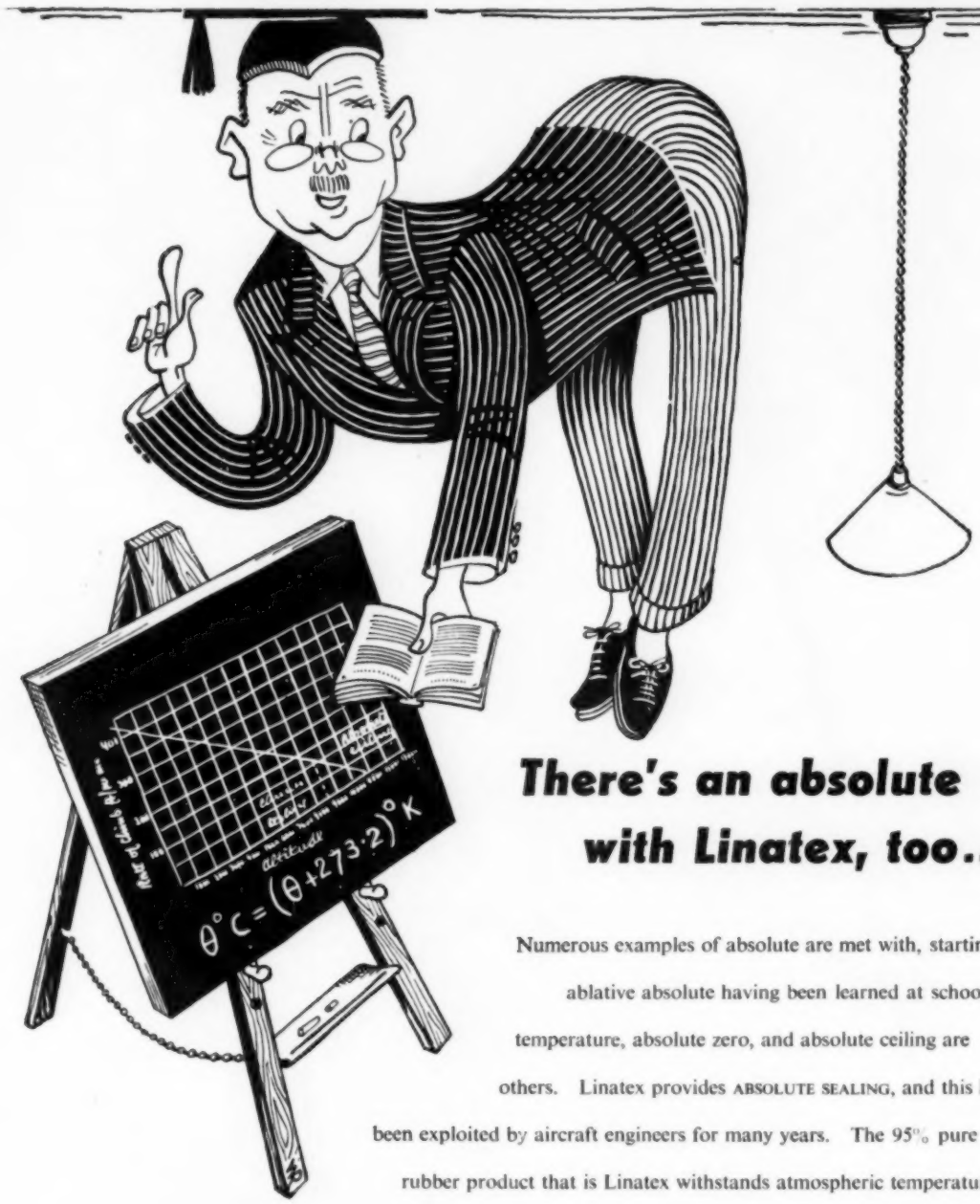
Following the Institute of Cost and Works Accountants' Fellowship examination, held last December, Mr. J. F. D. Cornish, works accountant with the Bristol Aeroplane Co., Ltd., has been awarded the Lewton Coronation Prize for management accountancy.

* * *

The Owen Organization has recently published a film catalogue which lists the large number of films that have been produced for member-companies of the group—which, with its parent company of Rubery, Owen and Co., Ltd., at Darlaston, South Staffs—is composed of nearly forty engineering firms.

* * *

From Smiths Aircraft Instruments, Ltd., who are sole sale concessionaires for Kelvin Hughes aviation instruments, we have received a copy of the current catalogue of this equipment. Very strongly bound, in loose-leaf form, it runs to no fewer than 190 pages giving complete performance and installation data on the company's range of flight, engine and miscellaneous instruments.



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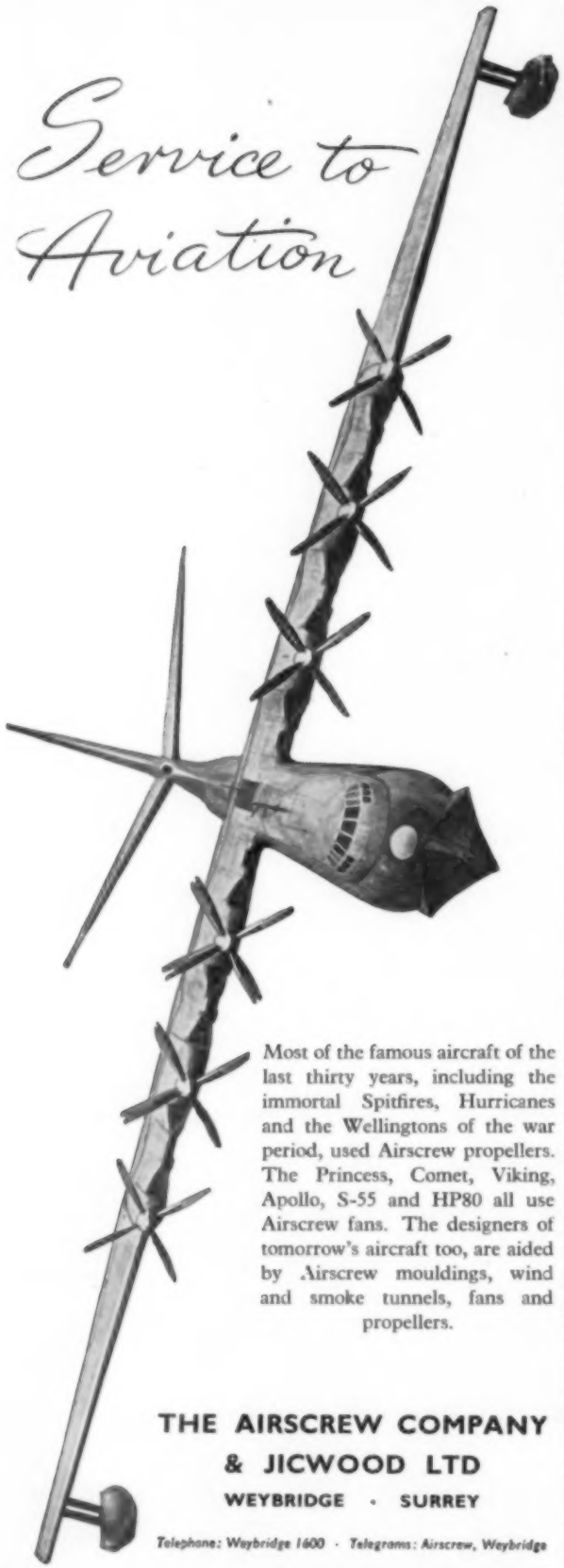

Most of the famous aircraft of the last thirty years, including the immortal Spitfires, Hurricanes and the Wellingtons of the war period, used Airscrew propellers. The Princess, Comet, Viking, Apollo, S-55 and HP80 all use Airscrew fans. The designers of tomorrow's aircraft too, are aided by Airscrew mouldings, wind and smoke tunnels, fans and propellers.

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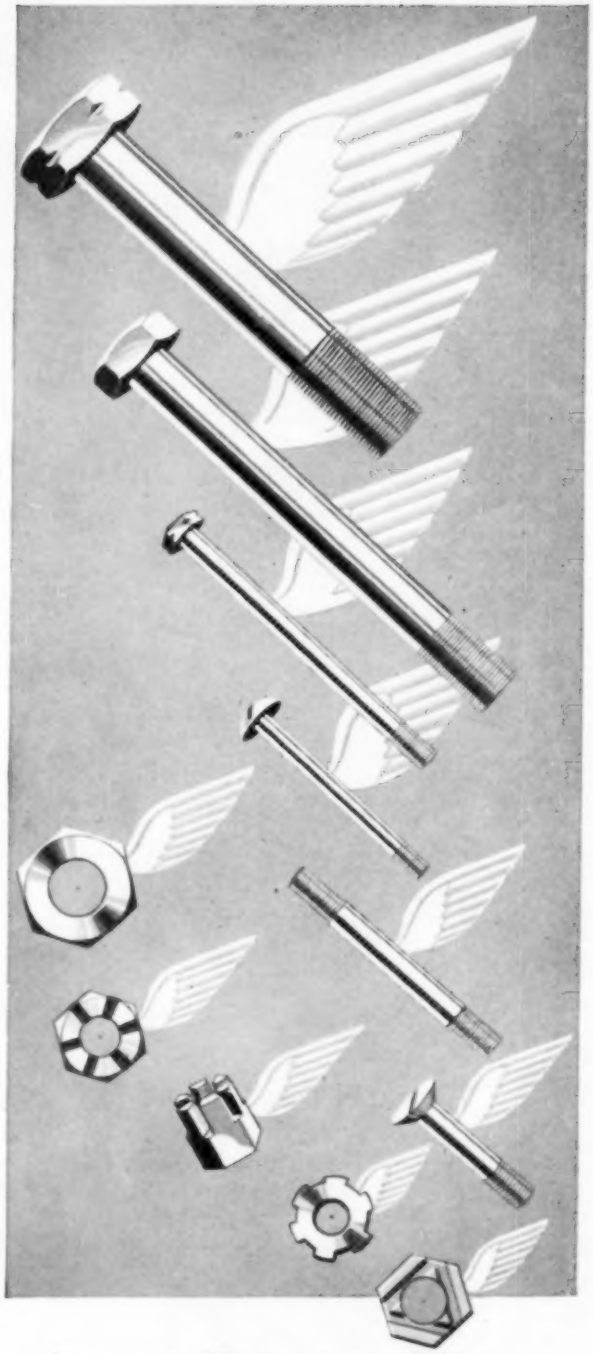

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CIVIL AVIATION

AGREEMENT ON WEATHER SHIPS

REVISED arrangements for financing and operating the North Atlantic weather stations were completed in Paris on February 24th, when delegates of twelve nations signed an agreement replacing that originally introduced in 1946 and extended three years later. Under the new agreement, which runs for two years from July 1st (with a possible automatic extension from year to year thereafter), there will be nine weather stations operated by 21 cutters, frigates or corvettes, instead of ten stations operated by 25 ships. The resultant saving in the total cost of the scheme (which has been estimated as about £6,250,000) is given as £1,360,000. The reduced scale of the programme is almost entirely due to the withdrawal of three of the fourteen ships formerly contributed by the United States and the elimination of weather station H, formerly operated by America.

There has also been a re-shuffle of the system of allocating the proportions of financial and material support by the various nations who benefit from the scheme. Iceland and Portugal no longer contribute but Israel, Italy and Switzerland have become parties to the latest agreement. Nations which receive some benefit from the programme but make no contribution to it are Columbia, Cuba, Mexico, Spain and Venezuela.

For the first time the agreement takes into account non-aeronautical benefits. Previously contributions were based solely on the number of transatlantic crossings made by aircraft of the participating nations. The non-aeronautical benefits considered include those provided for ships, such as the sighting of ice-floes, observations of wave-heights and sea-swell, and guarding of distress frequencies. It was agreed that the general public of countries surrounding the North Atlantic derive value from the floating stations in the form of better forecasts for shipping, fishing, agriculture, land transport and industry. The non-aeronautical value of the programme was assessed as 20 per cent of its total cost, and on the basis that weather moves from west to east, it was agreed that European states should pay 75 per cent of this proportion, the remainder being allocated to the United States and Canada. The North American share was further broken down into 85 per cent for the United States and 15 per cent for Canada.

TRANSATLANTIC JETS—ON PAPER

LAST Monday the B.O.A.C. operations room at London Airport inaugurated an imaginary daily jet "service" from London to New York *via* Gander. The Corporation's operations controller, Capt. A. S. Wilcockson, O.B.E., is in charge of this exercise, which will continue indefinitely and is intended to provide information for planning transatlantic services with Comet 3s. As on the existing transatlantic services, planning of the imaginary Comet flights will assume a full volumetric load: the route will be chosen to permit this load to be carried at all times.

Captain Wilcockson has stated that members of the operations department "will carry out the drill just as if there was an aircraft in the air." The daily routine is described by B.O.A.C. as follows: "At 8.30 every morning a B.O.A.C. operations officer will get from the airport meteorological office Atlantic weather information in the form of upper air charts, forecasts for Gander and alternate airports in the Maritime Provinces and details of forecast winds. He and a Comet captain will then decide the best routeing from London to New York, calculate the volume of fuel necessary and prepare a flight plan exactly as if a Comet 3 were really to make the flight. At 10 a.m. the 'departure' of 'G-BOAC' from London will be recorded on the movements board and signalled to stations along the route. As amended meteorological information is received any changes that would have been needed in the aircraft's flight plan will be calculated and any signals it would have been necessary to send will be prepared and filed.

"Throughout the flight Gander will prepare signals that would give the aircraft details of weather over the Western Atlantic and of landing conditions, and when the Comet 'arrives' at Gander its assumed time of touch-down from London and take-off for New York will be signalled to London Airport. Throughout the second part of the flight both Gander and New York will flight watch and advise the aircraft until the Comet's 'arrival' in New York is recorded.

"All the signals for the aircraft prepared at Gander and New York, together with details of the weather conditions that actually prevailed along the route, will be sent back to London for a subsequent reconstruction of the operation."

This procedure, it is thought, should provide B.O.A.C. with information on several aspects of Comet 3 operations, e.g.: desirable routeing and scheduling; the probable incidence of diversions from Gander; and the size of fuel reserves. The Corporation adds that schedules cannot yet be forecast with complete accuracy but that planning officers are thinking in terms of a 24-hour round trip from London to New York and back, allowing several hours for turn-round in New York.

In relation to problems of high-altitude weather, navigation and communications, and of traffic control, the "shadow operation" will be of only limited value. The upper-air exploratory flights to be made shortly with a Series 2 Comet will begin to fill some of the gaps in present knowledge of these subjects. Meanwhile, B.O.A.C.'s met. superintendent, Mr. E. Chambers, is reported to be "assembling all available information on North Atlantic weather conditions." Test pilots who fly regularly in the regions where the Comet 3 will operate have undertaken to provide information on the conditions which they encounter.

B.O.A.C.'s imaginary Comet 3 service appears to be patterned on the "Paper Jet" experiment carried out by United Air Lines between November 1952 and March 1953. Two "services" were operated daily between New York and Chicago and San Francisco and Chicago with a hypothetical jet airliner carrying 70-80 passengers at 550 m.p.h.

Footnote: G-BOAC left London Airport on schedule at 10 a.m. last Monday for Stephenville, Newfoundland. During the "flight" weather at Gander improved, and the imaginary aircraft was overhead there at 3.08 p.m., touching down at 3.15 p.m.

B.E.A. FARES INCREASE

ON February 23rd and 24th the Bailiffs of Jersey and Guernsey, Sir Alexander Coutanche and Sir Ambrose Sherwill, had talks in London with the Minister of Transport and Civil Aviation, Mr. Alan Lennox-Boyd. It was stated by the Ministry that the subject of the discussions was "the proposal to increase fares on the internal services of British European Airways, including the Channel Islands."

This was the first intimation of any such proposal. Subsequently a B.E.A. announcement admitted that most domestic fares would be increased by about 10 per cent when summer schedules were introduced next month. The increases were subject to the approval of the Minister of Transport and Civil Aviation and would not apply to the Scottish routes.

Concerning the Channel Islands services, the M.T.C.A. statement said that Mr. Lennox-Boyd "promised to give the most careful and sympathetic consideration to the arguments advanced . . . and said that he would cause a reply to be sent to the States of Jersey and Guernsey at an early date." The statement added that he "has recognized the special circumstances of the Channel Islands" and that Lord Douglas, chairman of B.E.A., had agreed that any increase of fares on the Channel Islands services should not apply to bookings accepted before March 1st.

Aer Lingus have announced increases averaging 3 per cent on most of their summer excursion fares, effective from April 1st.

NEW HUNTING-CLAN SERVICES

PLANS for introducng, on April 1st, the first direct air services between North-East England and Scandinavia have been announced by Hunting-Clan Air Transport, Ltd. It was intended to open these services soon after the inauguration of the airline's "northern network," based on Newcastle Municipal Airport at Woolsington, on May 15th last year. However, objections to the proposed fares were made by I.A.T.A. airlines. These have since been approved by I.A.T.A. as "special tourist fares" and are 10 per cent below normal rates for the area.

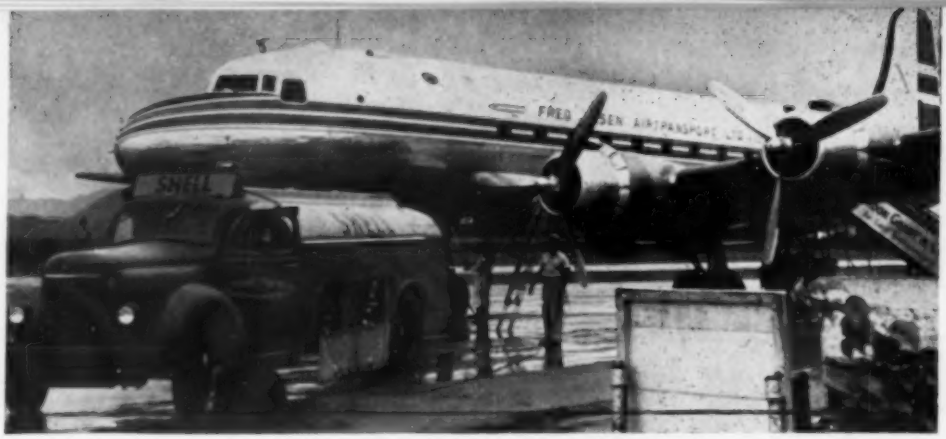
At present Hunting-Clan's Dakotas operate return services twice weekly between Woolsington and Amsterdam and Düsseldorf and once daily to London (from April 1st, as reported below, the frequency of the London service will be doubled).

The following new services will be inaugurated on April 1st: Newcastle-Oslo-Stockholm (twice weekly from April 14th); Newcastle-Hamburg-Copenhagen (twice weekly from April 9th); Newcastle-Manchester (daily except Mondays from April 9th). The daily feeder service from Glasgow to Newcastle will be resumed on April 3rd and twice-weekly services on the Newcastle-Paris route, also operated for a period last year, will be re-introduced at the same time.

Examples of fares charged on the new Hunting-Clan routes are as follows: Newcastle to Copenhagen or Oslo, £12 single, £21 12s return; Newcastle-Stockholm, £25 16s single, £46 9s return; Newcastle-Hamburg, £14 single, £25 4s return. The return fares from London to Oslo and Stockholm are respectively £42 6s and £50 17s, which correspond almost exactly to the B.E.A., S.A.S. and P.A.W.A. fares for the direct journey.

On Tuesday, March 1st, Northolt (instead of Bovingdon) became the London terminal for Hunting-Clan's northern network. The move reduces the average time between city centres on the London-Newcastle service from 3 hr 20 min to 3 hr. From April 1st the airline will double the frequency of the service, providing two

CIVIL AVIATION . . .



REFUELLING at Port of Spain, Trinidad, for a DC-4 of Fred Olsen Airtransport, Ltd. This enterprising Norwegian independent recently placed an order for two 44/57-seat Viscount 736s.

flights daily on the route and enabling business-men to fly from one city to the other in the morning, do a day's work and return the same evening.

The present service leaves Woolsington, Newcastle, at 8 a.m. each morning, arriving at Northolt by 9.40; there is a 40-minute turn-round period and the London-Newcastle service leaves at 10.20 arriving at noon. From April 1st the two additional departures daily will be from Woolsington at 5.30 p.m. and from Northolt at 7.50 p.m. All services are operated by 28-seat Dakotas.

CONDITIONAL TAKE-OFF CLEARANCE

A NEW traffic procedure designed to increase runway utilization at British airports is outlined in *Civil Aviation Information Circular* No. 27/1954. It takes the form of a conditional take-off clearance to be given by A.T.C. to a pilot waiting to depart. Control will offer the pilot the option of taking off within a maximum number of seconds (normally between 30 and 90) or of holding his position until an approaching aircraft has landed.

Circumstances under which conditional take-off clearance will be issued, at the discretion of A.T.C., depend on the weather prevailing, and on the type of approach being made by the incoming aircraft. For example, in I.F.R. weather conditions, a waiting aircraft may be conditionally released if the approaching machine is being controlled or monitored by G.C.A. and is between 3 n.m. and 6 n.m. from touch-down.

K.L.M. FLEET RE-LETTERED

A MODIFIED system of aircraft registration is being introduced by K.L.M., and new letters are being painted on practically the entire fleet at the first opportunity provided by overhaul schedules. The initial letters PH, as carried by all Dutch civil aircraft, are retained, but the three remaining letters will be allocated on the following basis: third letter to represent the manufacturer; fourth letter to indicate the type of aircraft; fifth letter to identify an individual machine.

The following examples illustrate the application of the new system. Convair 240, *Rembrandt*, formerly PH-TEB, becomes PH-CEB; Convair 340, *Pieter Breughel*, formerly PH-TGD, becomes PH-CGD; DC-4, *Schiedam*, formerly PH-TAS, becomes PH-DBS; DC-6, *Prince Bernhard*, formerly PH-TPB, becomes PH-DPB; DC-6B, *Jan van Riebeeck*, formerly PH-TFH, becomes PH-DFH; DC-6A, *Dr. Ir M. H. Damme*, formerly PH-TGA, becomes PH-DFA; Constellation, *Amsterdam*, formerly PH-TDK, becomes PH-LDK; Super Constellation *Atoom*, formerly PH-TFP, becomes PH-LKP.

The present fleet of K.L.M., including aircraft based in the West Indies, consists of 19 DC-3s; eight Convair 240s; seven Convair 340s, with seven more not yet delivered; ten DC-4s; six DC-6s; seven DC-6Bs; two DC-6As; ten Constellations; and nine Super Constellations. Four more Super Constellations have yet to be delivered.

B.O.A.C. APPOINTMENT

FORMERLY traffic manager at London, Mr. Gilbert Lee has been appointed as B.O.A.C.'s London Manager (subsidiaries) in succession to the late Capt. V. Wolfson, who lost his life in the B.O.A.C. Comet disaster near Elba on January 10th. Mr. Lee has had a long career in British civil aviation, beginning with his appointment as an accountant with Imperial Airways in 1930, and has held senior positions in the Near and Far East and in Africa. The subsidiary companies with which he will be concerned are Aden Airways, Bahamas Airways Ltd., British West Indian Airways Ltd., Gulf Aviation Co., Ltd., and International Aeradio Ltd.

(Right) Mr. Gilbert Lee.

ATLANTIC TRAVEL APPEAL

AN appeal for some relaxation of the currency-control measures which restrict the number of European travellers visiting North America has been made by the director-general of I.A.T.A., Sir William Hildred. Writing in a review published by the international Union of Official Travel Organizations, Sir William says: "I have become increasingly struck by the fact that North Atlantic traffic is still very largely a one-way affair and that we are, in a sense, realizing only half of its potential. Whilst a very great many of the 150,000,000 Americans each year manage to visit the continent of Europe, the 300,000,000 Europeans get virtually no chance at all to visit North America as tourists."

It was high time, he said, that Europeans had an equal chance to see something of North America—"that great continent in which so much of the world's destiny is being forged." Sir William added: "The treasuries of Europe, the bankers and the economists will be able to marshal many telling arguments against this idea. They will cite the balance of payments and the shortage of currencies. I can quote against them the balance of goodwill and the shortage of international understanding. . . . Let us remember that civilization flows from the meetings of peoples; and this means the freest possible transport and travel."

SEA AND AIR

A TOPICAL note on the possibilities of investment by shipping companies in air transport appears in the annual report of the Chamber of Shipping of the United Kingdom. After recalling "repeated attempts by the industry to secure from successive governments recognition of the fact that the shipping industry . . . was peculiarly fitted for playing a prominent part in the development and expansion of air services," the report observes that: "In recent months there have been indications that the Government is prepared to encourage independent operators to participate in the development of air transport on routes not covered by or in activities supplementary to those of the Corporations."

The shipping report adds that, "if shipowners were to be restricted to 'freight only' services, they would be heavily handicapped in competition with the air services of the Corporations and of foreign countries catering for all classes of traffic." It concludes: "Shipowners must now consider whether there is open to them a sufficiently wide field not covered or likely to be covered by the Corporations and capable of expansion in which they would further the development of British air transport."

FRENCH AIRPORT STUDY

A NEW book* published under the auspices of the French National Foundation of Political Science is claimed to be one of the first studies to be produced in Europe concerning the economic problems of airfield infrastructure and its effect upon the general development of air transport. The author, Claude Postel, first outlines the basic factors governing the intensity of operations from an airfield, dealing in particular with the two Paris airports, Orly and le Bourget.

He makes a detailed examination of the running of these two airfields with a study of the fluctuations of operations between 1920 and 1938, with particular emphasis on the effects of the economic crisis of 1930. Following this, he makes a provisional estimate of traffic development up till the end of 1959, in which year, he claims, 2,700,000 passengers will pass through the Paris airports compared with 1,400,000 in 1953.

M. Postel also studies the difficult question of the proportion of investment in air transport facilities as opposed to other means of transport, both in relation to a national economy and to the economy of Europe as a whole, if this should ever become an economic entity. Finally, he states a political theory of aeronautical infrastructure related to France's own political and economic status. He claims that wealth will in future come to those countries who have provided for the construction of large airports.

* *L'Aéroport de Paris, by Claude Postel, published by the Librairie Armand Colin, 103, Boulevard Saint-Michel, Paris 5, price 650 francs.*

TWO FROM FRANCE: Now under test, the two-seat C.A.B. Supercab (left) is powered by a 90 h.p. Continental, giving a speed of 160 m.p.h. and range of 430 miles without the proposed wing-tip tanks. On the right is the first flying view of the SCAN 30 Widgeon with Gipsy Queen engines, the licence for which is held by Agence Aéronautique Legastelois.

PLUGS FOR HIRE

DISCUSSING the high cost of power-plants in his recent Brancker Memorial Lecture, Sir Miles Thomas suggested that in future airline operators might buy engines in terms of flying hours, just as road operators bought tyres on a mileage basis. This, he said, would be real private enterprise—the manufacturer backing his product throughout its life.

A small-scale application of this principle was mentioned in the recent joint announcement by Smiths Aircraft Instruments, Ltd., and Eagle Aircraft Services, Ltd., regarding the installation of K.L.G. sparking plugs in all Eagle Aviation Vikings. These plugs are to be maintained on a servicing and replacement basis by an over-the-counter immediate exchange service at Smiths' L.A.P. depot. After the approved period has elapsed plugs are removed and immediately replaced by a fully serviced set. All costs are determined by the number of hours flown.

BY ANY OTHER NAME . . .

EARLIER this month an American non-scheduled carrier operating as North American Airlines was ordered to change its name as a result of legal action initiated as long ago as August 1951 by North American Aviation, Inc., the manufacturing company. In issuing the formal injunction ordering the change of name, a district court judge found that the airline's "uses of the name North American were designed, intended and calculated to, and have resulted in the deception, confusion and injury of the public" and that the name North American was not used innocently or in good faith, but "deliberately and fraudulently."

The defendants were ordered to pay costs and to "deliver up for destruction all advertisements, cards, pamphlets, posters, schedules, lists, signs, and all other material bearing the name North American."

BREVITIES

FOLLOWING its recent negotiations with S.A.S., the Soviet airline Aeroflot has agreed to pay a commission of 5 per cent on all S.A.S. tickets and waybills issued for travel over the Russian network. Previously Aeroflot had refused to pay any commissions to agents.

* * *

Interline transactions between I.A.T.A. carriers reached a total of $241,632,000 (over £86m) during 1953, an increase of more than 10 per cent on the 1952 figure. All but 11.6 per cent of the transactions were cleared automatically by offset without any cash payment.

* * *

At the recent opening of B.E.A.'s new city terminal in Glasgow, Mr. Robert Taylor, a member of the Scottish Advisory Council, suggested that in the not-too-distant future there might be a helicopter service between Enoch Square and the Highlands and islands. Sir Patrick Dollan, chairman of the Council and a B.E.A. director, agreed that such a development might be expected within ten years.

* * *

Believed to be the first aircraft of its type sold outside America, a Beech Twin Bonanza was recently delivered to Durban for use by the Consolidated Diamond Mines of South West Africa. In addition to its regular work as an executive transport, the aircraft is expected to be used as a light freighter and air ambulance. A special dollar allocation was required for the mining company to import the Twin Bonanza, at a cost of £22,000.

A new 6,000ft runway was opened last month at Bulltofta Airport, Malmö, which was once Sweden's main civil aerodrome.

* * *

Mr. V. P. Field, South African representative to I.C.A.O. in Montreal, has been appointed manager of Jan Smuts Airport, Johannesburg. He is expected to take up his new appointment on March 15th.

* * *

Mr. J. C. Farmer, deputy director of telecommunications in the M.T.C.A., heads the United Kingdom delegation to the Fifth Session of the Communications Division of I.C.A.O., which begins in Montreal on March 9th. Subjects to be discussed during the session, which will last five or six weeks, include long-range navigational aids, secondary radar, methods of improving air-ground communications, and the general testing of navaids.

* * *

Bendix cloud-warning radar working on a 3.2 cm wavelength is being installed in the nose of one of the DC-6Bs operated by Pan American-Grace Airways. The equipment will be tested in scheduled service between Miami and Buenos Aires and if it proves successful will be ordered for Panagra's entire fleet. United Air Lines have been experimenting with R.C.A. (Radio Corporation of America) cloud-warning radar for about a year. However, such equipment is fitted as standard only on large American military transports and on the two Comets operated by the R.C.A.F.

AUSTERS AWAY: Shown lined-up at Rearsby, the left-hand quartet of Aiglet Trainers and Autocars (two of each) has been ordered for use by the Kuwait Aero Club. On extreme right are Aiglet Trainers of the Airways Aero Club, whose pilots ferried the export Austers to Croydon on the first part of their journey to the Persian Gulf.

Contractors Dine at Boscombe Down

THE Aeroplane and Armament Experimental Establishment were once again the hosts to the Aircraft Contractors at an excellent dinner at Boscombe Down last Friday. The invitations stipulated "Dinner 7.30 for 8 p.m.," and it was a well-deserved compliment to the hosts that the majority of guests who filled the Mess to capacity had parked their cars, and been received by the Air Commodore Commanding, by 7.45 p.m.

A. Cdre. A. H. Wheeler, O.B.E., proposed "The Guests," mentioning subsequent speakers by name and also welcoming especially the Controller of Aircraft and the Chief Scientist of the Ministry of Supply. Then, in reviewing some of the year's highlights, he spoke of S/L. "Dick" Whittington's Canberra flight to Australia. S/L. Whittington has now joined the parent firm, and of this event the air commodore said: "This migration to industry has become extremely prevalent, and although we view with some concern the loss of experienced test pilots from the Service, we take pride in the fact that the industry seems to value the experience and ability our pilots bring them, not to mention the E.T.P.S. training, which thus becomes available—so cheaply!"

The next event mentioned by the speaker was the opening of the local branch of the Royal Aeronautical Society, at which Sir Frederick Handley Page made the opening address.

Of the A. and A.E.E.'s entry in the R.Ae.C. competition for the design of a racing light aeroplane, A. Cdre. Wheeler said: "We felt that with our experience of seeing other design teams' efforts and of reading design-studies, we should have a fair chance of achieving reasonable results in the competition. I think the interesting thing about the brochure we put in was the introduction: about half of it went to giving the reasons for adopting the various features we had, and the other half went to giving the reasons for not adopting features which we thought our competitors might have selected. This idea was not, of course, copied from the aircraft industry. However, as a result of the brochure and its introduction we won the competition."

The final highlight of the year to be mentioned by the air commodore, and for which he gave the Treasury credit, was the near-completion of the new large hangar wherein is installed a weighbridge capable of weighing the largest aircraft likely to visit Boscombe for some years to come. He thought it would be quite interesting for all to know in future what some aircraft *really* weighed and where their c.g. *really* was. The radiant-type heating of the hangar was also of interest.

A. Cdre. Wheeler went on to say that the year had been free from queries and insinuations as to whether the Establishment's job was really necessary; but in case there were still some doubts he would recall some lines from Mallory's *Morte d'Arthur*. The passage concerned Sir Galahad's fight with a giant, and it said "Then did Sir Galahad look well to his harness that nothing failed him on the morrow." The interest was that Sir Galahad did the checking *himself*. A man of his influence could easily have sent it down to the maker, who would not have been very far away in those days. Perhaps he knew that if he did so he would only have got into a welter of argument about the relative advantages of different shapes of battle-axe—delta, crescent and so on. And there might have been at least one manufacturer to point out that Sir Galahad was bound to win because the giant's heavy and cumbersome armament would be no match for the light, quick equipment with which the knight was doubtless provided.

"We in the Services like to do a lot of handling and testing ourselves," concluded A. Cdre. Wheeler, "and we all value the tradition of working together to the same end which has been built up during the years."

Mr. W. E. W. Petter, C.B.E., replying for the guests, said that he had always admired the realism and open-mindedness of Boscombe, and of Martlesham before it. It was a pity that more notice was not taken of the findings of the A. and A.E.E. As a result, he thought the R.A.F. was in process of finding out the hard way. Mr. Petter said that in Europe there were 150 million people outside the Iron Curtain, and there must be great skill amongst them. Their requirements were not necessarily the same as ours. This country had a great opportunity to let our industry play a part in equipping NATO and European countries. The generously given American equipment was not necessarily the best answer.

Mr. A. R. W. Low, C.B.E., D.S.O., M.P., Parliamentary Secretary to the Ministry of Supply, proposed "The Aircraft Industry." He introduced his long and informative speech by saying that the toast was no mere formality. It was his Ministry's closest and most constant concern.

More money from the Defence Estimates was now going to aircraft, and it was generally recognized that the M.o.S. and industry were doing much more than they could say they were doing. Little was known to the public until four years after it had been done.

Referring to Mr. Shenstone's much-discussed statement at Southampton, Mr. Low said that the remarks were generalizations from the particular. The M.o.S. had found them wholly non-proven.

Next, the Parliamentary Secretary said that aircraft flying fastest and highest were no good to the Services if they could not fight there. Today we were trying to produce inhabited missiles rather than aircraft. The complete equipment was what mattered when talking of times of delivery. Today aircraft were complicated to design and produce, in order that they should be simple to operate. One could not compromise about quality of Service aircraft. If they were inadequate for their job, then to have twice as many of them was no comfort. Military requirements must be based on the enemy's capacity, not on our own desires.

The reply for the aircraft industry was given by Sir Roy Dobson. He said that a lot of time and expense and trouble for the test pilot could be saved by doing much of the test work on the ground.

Export sales totalled £65 million and were still rising, and we had hardly begun to sell turbine airliners. Sir Roy also said that the present bombers and fighters were "O.K.," but the next fighters in America were ahead of us—the F-100s were on the production line and we had not a counterpart. It was not the lack of skill or inventiveness; it was policy and the fact that money was not forthcoming. We wanted materials, presses, titanium. It was now a case of what we could afford *not* to do. In the front line we must be at readiness even more than Uncle Sam—who, by comparison, would have time to take a breath; and, said Sir Roy, we needed readiness in depth.

VARIED VIEWS AT AERODROME OWNERS' DINNER

MANY notable guests attended the dinner of the Aerodrome Owners' Association at the Hyde Park Hotel, Knightsbridge, on Thursday of last week. Reference is made in our leading article to some of the matters raised in the course of seven speeches.

Mr. Peter Masefield, M.A., the first speaker, said that the helicopter would become a very important part of Britain's internal transport, but it would be ten years before helicopter services were seriously introduced. Meanwhile, those who were on the operating side hoped that members of the Association would continue their studies of rotorstation problems and that they would manage to place the stations in the centres of cities—otherwise they would be of no use. Mr. Masefield added that if they could be put on the top of buildings it would make approach and landing easier and take the noise from the level of streets.

Alderman Charles M. Newton, M.B.E. (Sywell), chairman of the Association, spoke of the shortage of new light aircraft in the country. He advocated importing 200 American private aircraft to give a fillip not only to sporting and private flying but also to charter flying. This would also help the Aerodrome Owners by bringing in £42,000 a year in landing fees. Such a course would not harm British manufacturers, because they were not interested in the production of light aircraft.

G/C. C. A. B. Wilcock, O.B.E., A.F.C., A.F.R.Ae.S., M.P. (Derby, Wolverhampton and Elstree), had a variety of points to make. Referring to the Reserve schools closure, he said it would be idle to suggest that the schools did not help towards the cost of maintaining and operating the fields, but it was not too high a price to pay; and it was a wrong policy to break up the schools, thereby dispersing the flying personnel, maintenance staffs and placing in jeopardy the continuance of these well-sited airfields. It would be imprudent for the Air Ministry to lose interest in the future of the small airfields. To be fair, that had not so far happened—small contracts had been placed by the Air Ministry and there was also the cadet scheme to help.

The group captain urged the Air Ministry and the M.T.C.A. to go out of their way to help municipalities and other aerodrome owners. Such action would certainly receive support in Parliament from the many members who were concerned at the possible fate of civil aerodromes within their constituencies. Every town would in the near future require its local airfield to handle its freight, quite apart from its passenger traffic, and to house and maintain helicopters operating within the town itself. We were going to see an extension of private ownership, whether by the individual or the commercial concern. There were over 82 towns and boroughs in this country with a population of over 100,000, and any which did not have the services of an aerodrome would be regarded as backward and out of date.

G/C. Wilcock concluded with an appeal to the Air Ministry to help the small-aerodrome owner bridge the next few difficult years by giving maintenance work and training; to the M.T.C.A., to lend equipment and to encourage efforts in the field of charter flying and freight carrying; and, finally, to the aircraft manufacturers to support the clubs using the small aerodromes by supporting the works flying scheme and by producing new small aircraft, even at a loss.

Air Marshal Sir Hugh Walmsley, K.C.B., K.C.I.E., C.B.E., M.C., D.F.C. (Air Service Training, Hamble), said that this country was not airminded. Without aviation during the war we should have been invaded, but memories were short. It was his experience that prep school-boys were keen and airminded, but their enthusiasm wore off under the influence of parents and schoolmasters. Broadly speaking, the country stood or fell on the question of air power. During the last emergency the average intake of 300 pilots per year had been bumped up to 2,000 with the help of the clubs. Today we were short of operational pilots but there was a glut of fair-weather non-operational pilots. There was a demand for the highest quality, but we were not getting them, for military or civil flying. We were also short of skilled men.

Alderman Col. R. Mould-Graham, O.B.E., M.C., T.D., D.L. (Newcastle-on-Tyne), talked of progress and traffic at small airports. While the large fields handled 3,600,000 passengers in 1953, a 24 per cent increase, small municipal fields handled 19,000 in 1953 as against 15,000 in 1952, and his own town dealt with 5,000 air passengers in 1952 and 15,000 in 1953. He looked forward with confidence.

A.V-M. the Earl of Bandon, C.B., C.V.O., D.S.O., in an entertaining speech, said that while there might be shortages of pilots in the Air Force the skill and training of those we did have in service was as good as it had ever been.

Mr. S. Kenneth Davies, C.B.E., chairman of the Royal Aero Club, said that light aircraft flying had not changed so much. Private owners were not in a position to give much financial help, but they would be keen to come and support any airfield in which one could land a light aircraft; this, he felt sure, would lead to bigger things eventually. He recalled his first view of Filton, a tiny airfield in 1920, and compared it with the enormous establishment of today. This sort of development should provide encouragement.

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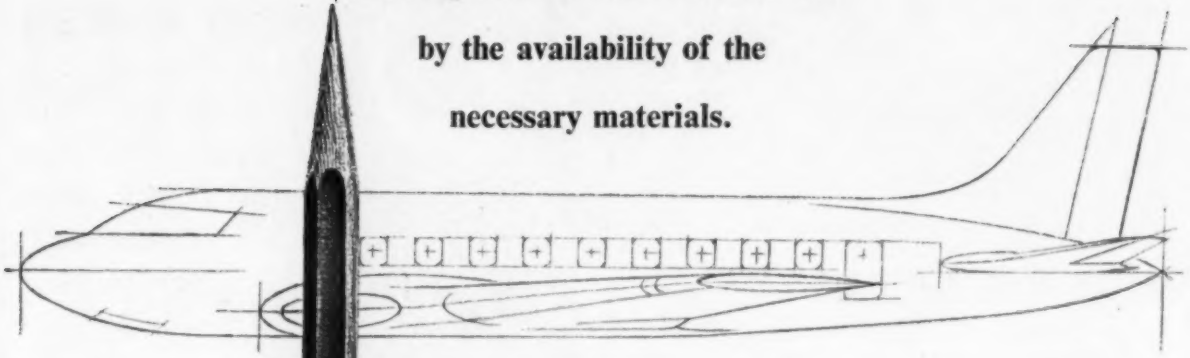

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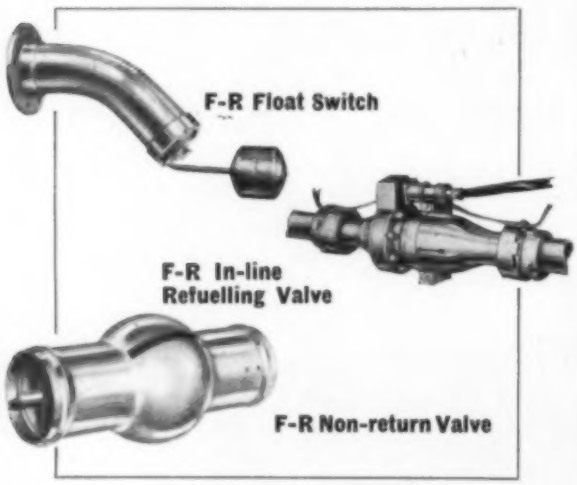

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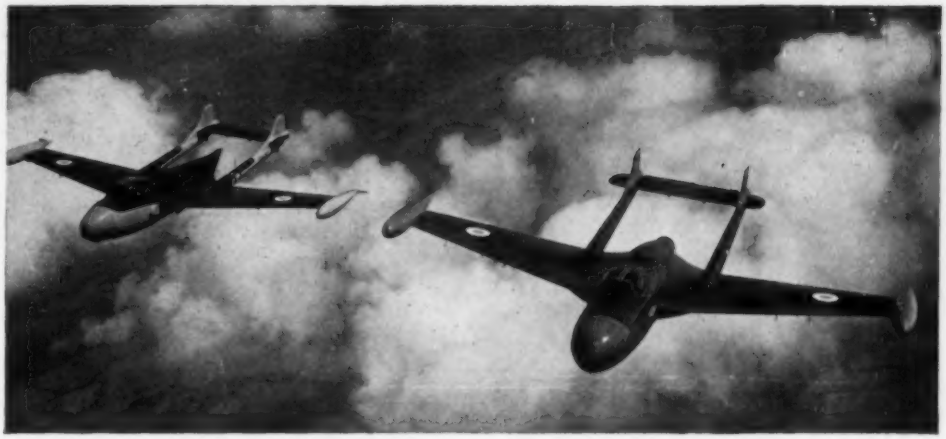

"Flight" photographs

TWO OF A KIND, though by no means identical, are the de Havilland Venom N.F.3 night fighter (right) and the Sea Venom N.F.21. Both types are scheduled for extensive service with the R.A.F. and Fleet Air Arm respectively.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

Esher Trophy Winners

TO the undoubted gratification of their Honorary Air Commodore, Sir Winston Churchill, No. 615 (County of Surrey) Squadron have won the Esher Trophy. He has sent the commanding officer, S/L. R. A. Eeles, his congratulations, as has also Air Marshal Sir Dermot A. Boyle, A.O.C-in-C. Fighter Command.

Last year No. 615, as runners-up to No. 610 (County of Chester) Squadron, were only four points behind. This year competition has been even more severe. No. 609 (West Riding) Squadron is second by only three points. No. 601 (County of London) Squadron is placed third, and honourable mention, as it is termed, is made of No. 502 (Ulster) Squadron.

Although a "Surrey" squadron, No. 615 is stationed at Biggin Hill, Kent. It is equipped with Meteor 8 aircraft.

Orenda Sabres Arrive

ON their way to the R.C.A.F. base at Baden-Soellingen, Germany, 14 Orenda-engined Mark 5 Sabres landed at Kinloss, Scotland, on February 23rd, after having flown the Atlantic. They arrived in Germany the following day. S/L. R. G. Middlemiss, O.C. No. 1 Overseas Ferry Unit, R.C.A.F., was in command during the delivery flight.

As the Canadian squadrons become equipped with Sabre 5s their redundant Sabre 2s will be handed over to the air forces of other NATO powers. The R.C.A.F. has 13 squadrons in Britain and Europe.

In the Mark 5 Sabre the General Electric J47 turbojet of 5,200 lb thrust is replaced by the Avro Orenda with 7,200 lb thrust. This change is, of course, reflected in much-improved maximum speed and rate of climb, a higher ceiling, and a shorter take-off run.

Welsh Emblems on Standards

STEPS are being taken to remedy the absence of an emblem representing Wales on the Squadron Standards presented to units in recognition of special operational service or 25 years' continuous service. The Queen has approved a new design in which the leek is incorporated to represent the Principality. This was announced recently in the House of Commons by the Under-Secretary of State for Air, in answer to a question.

Air Ministry Appointments

TWO officers have returned from abroad to take up appointments in the Air Ministry. A. Cdre. R. K. Hamblin, C.B.E., has left No. 205 Group, M.E.A.F., where he was A.O.A., to become Director of Postings (A). A. Cdre. B. A. Casey, O.B.E., who becomes the new Director of NATO Liaison, has returned from Washington, where he was doing similar work between the British and United States planning staffs as a member of the NATO Standing Group.

Another new appointment is that of A.V-M. S. R. Ubee, C.B., A.F.C., who is now Director-General of Personnel (II). For the past two and a half years A.V-M. Ubee has been Commandant of the R.A.F. Flying College at Manby. During 1946 and 1947 he commanded the Empire Test Pilots' School.

Korean Awards

A NUMBER of honours and decorations have been made to Service personnel in recognition of their service in the Korean war zone.

FLEET AIR ARM

O.B.E. (Military Division).—To Capt. O. N. Bailey, R.N., for outstanding leadership and devotion to duty as the second-in-command and head of the Air Department of H.M.S. *Ocean* in two operational tours in Korean waters. To Cdr. T. G. V. Percy, D.S.C., R.N., as Fleet Aviation Officer serving continuously in the Korean war for 18 months; Cdr. Percy contributed greatly to the extremely successful British and U.S. carrier operations in the Yellow Sea.

D.S.C.—To Cdr. A. W. Bloomer, R.N., for outstanding leadership and devotion to duty while in command of 810 Squadron in H.M.S. *Ocean* during the Korean operations. His untiring enthusiasm, says the citation, was an inspiration to his squadron, which on all occasions pressed home their attacks on the enemy with skill and success. When he was called upon to form and train a night fighter unit to operate from shore against night bombers, his flight quickly attained a high standard of operating, and there is little

TRANSATLANTIC ARRIVALS: Refuelling the Avro-Orenda-powered Mark 5 Sabres on their arrival at R.A.F. station Kinloss, Scotland, from Iceland. (See "Orenda Sabres Arrive," this page.)

SERVICE AVIATION . . .

doubt that the presence of this unit contributed to the falling off of the enemy night effort.

ROYAL AIR FORCE AND ARMY

O.B.E. (Military Division).—To W/C. D. MacKenzie, D.F.C., Far East Flying-boat Wing. W/C. Mackenzie has commanded the Far East Flying-boat Wing since the outbreak of the Korean war, and has moulded its squadrons into a cohesive organization and maintained their flexibility. He has many times flown on Korean operations with squadrons of the Wing.

D.F.C.—To S/L. H. T. Francis, who has commanded a Sunderland squadron of the Far East Flying-boat Wing for 18 months and completed 38 sorties on anti-shipping and anti-submarine operations. To F/O. G. A. Chesworth, who flew his 58th and last sortie in the Korean campaign in June 1953; although young, he became captain of a Sunderland and undertook the regular Korean commitments, with their continuous flying hazards, with calm courage and steadfastness. To F/L. M. G. Bennett, who, as captain of a Sunderland carried out 47 operational sorties in the Korean war; his ability as captain and pilot made possible, in unpleasant and dangerous conditions, operations which would otherwise have been cancelled.

Mentions in Despatches.—F/Ls. D. B. Robinson, L. H. Tester, D.F.M., and E. P. Wildy. F/O. G. H. Gilbert. M.Eng. J. Davidson. F/Sgt. R. J. K. Nicholas. Sgts. J. Cahill and M. J. B. Culverhouse. Cpls. L. Elliott, H. E. Garratt, E. H. Longe, T. P. Moulton and L. F. Prudden. S.A/C. R. A. Beynon. L.A/C. C. G. Hartshorn. Capt. A. S. Stepto, R.A., and Sgt. A. J. Brennan.

Royal Navy Appointments

THE Admiralty has announced the appointment of Vice-Admiral J. P. L. Reid, C.B., C.V.O., as Flag Officer, second-in-command, Mediterranean Station and Flag Officer (Air) Mediterranean, in which post he relieves Vice-Admiral W. W. Davis, C.B., D.S.O., who now is Vice-Chief of Naval Staff.

A number of appointments in the rank of captain have also been announced. Capt. J. A. Ievers has gone to the Naval Air Warfare Division at the Admiralty and Capt. P. D. Gick is now in command of R.N.A.S. Lossiemouth.

Capt. A. S. Bolt has become Chief of Staff to Flag Officer Air (Home) at Lee-on-Solent and Capt. I. R. Sarel has taken over command of R.N.A.S. Gosport. Capt. (E) E. Mill is now Superintendent, R.N. Aircraft Yard, Belfast.

Capt. K. Williamson, D.S.O., is now with Air Organization and Training Division at the Admiralty and Capt. O. N. Bailey has become a staff officer to Flag Officer Air (Home). Capt. M. P. Lawson has taken up his new post as Captain (E) in the Aircraft Maintenance and Repair Department at the Admiralty.

PRESENTATION: Air Marshal Sir Harry Broadhurst, K.B.E., C.B., D.S.O., D.F.C., A.F.C., Commander-in-Chief 2nd T.A.F., handing the Duncan Trophy to S/L. R. N. G. Allen, D.F.C., Commanding Officer of No. 93 Squadron. (See "Duncan Trophy," above).

PARIS PARTY: M. Paul Reynaud, Vice-Premier of France, with Marshal P. A. Juin and Air Chief Marshal Sir Basil Embry at the reception given in Paris on February 18th to celebrate the release by bombing of French Resistance leaders incarcerated in Amiens gaol in 1944. The meeting was reported on page 227 of our last week's issue.

R.Aux.A.F. Appointment

THE Air Ministry has announced the appointment of S/L. A. R. Poole, D.S.O., D.F.C., to command No. 2611 (West Lancashire) L.A.A. Squadron, R.Aux.A.F.

S/L. Poole, who has been serving in various capacities in the R.A.F.V.R. since 1949, was a specialized air gunner during the war and served in, among other bomber units, the famous No. 617 ("dam-busters") Squadron.

Duncan Trophy

COMPETED for between fighter squadrons of 2nd T.A.F. for the first time, the Duncan Trophy for air-to-air firing has been won by No. 93 Fighter Squadron with No. 5 Squadron as runners-up.

Presentation of the trophy was made by Air Marshal Sir Harry Broadhurst, C-in-C. 2nd T.A.F., to S/L. R. N. G. Allen, who commands the unit.

No. 93 Squadron originated in 1940 from No. 420 Flight, which was formed for the purpose of experimenting in the use of aerial mines in the interception of enemy aircraft. This work was discontinued at the end of 1941 and the unit became a Spitfire fighter squadron. It is at present based at Celle, Germany, and is equipped with Vampires.

Two Notable Anniversaries

TOMORROW, March 6th, marks the anniversary of the launching of two major R.A.F. Bomber Command offensives which are regarded today as turning-points in the course of the air war against Germany.

The first was the Bomber Command raid on the night of March 5th-6th, 1943, when 442 aircraft were despatched against Essen in the Ruhr. Marshal of the R.A.F. Sir Arthur Harris, then A.O.C-in-C. Bomber Command, has since stated that his Command's main offensive began with the launching of this major attack against Essen. This raid was of particular importance, for it marked the first major attack on a German objective in which Oboe, an important navigational aid, enabled pathfinder aircraft without visual assistance, to pin-point targets.

Key aircraft in this historic raid were the eight Mosquitoes carrying the new Oboe equipment on which the success of the operation ultimately depended. They dropped red target-indicators on the aiming point and these were supplemented by green flares dropped by heavy aircraft. The main force, following the Mosquitoes, were so concentrated that only 14 aircraft (or just over three per cent) of the total were lost in attacking a target hitherto considered almost invulnerable. The successful introduction of Oboe on this night set the pattern for further intensive attacks against Essen and many other industrial targets within range of the new equipment; the Ruhr's industrial haze was no longer a protective covering for the concentrated war industry in this vital area.

Exactly one year later the first air attack was launched in the offensive in preparation for the invasion of Europe. Marshal of the R.A.F. Lord Tedder, then Air C-in-C. and Deputy to General Eisenhower, has stated that the decision to mount this offensive has been proclaimed as one which contributed most to the paralysing of Germany's military strength, and was the decisive factor ensuring success for the Allied landings. It began with an attack on the railway yards at Trappes. During the following ten weeks 36 similar targets were attacked by Bomber Command and were judged to be so severely damaged that no further attacks by heavy bombers were considered necessary.

Reunions

THE seventh reunion dinner and annual general meeting of No. 2 Group Officers' Association (including No. 2 Group units, past and present) is to be held on Saturday, May 8th, at the Park Lane Hotel, London. The A.G.M. is at 6 p.m. and the dinner at 7.30 p.m. A special welcome is extended to ex-W.A.A.F. officers. Particulars from S/L. J. A. Beattie, 6 Leamington Road Villas, London, W.11.

For their sixth reunion dinner, to be held on Saturday, March 27th, No. 106 Squadron are foregathering at the Magpie and Stump, Old Bailey, London, E.C.4. Particulars and tickets (12s 6d) from R. G. Purnell, New Orchard House, Sevenoaks Road, Pratts Bottom, Kent.

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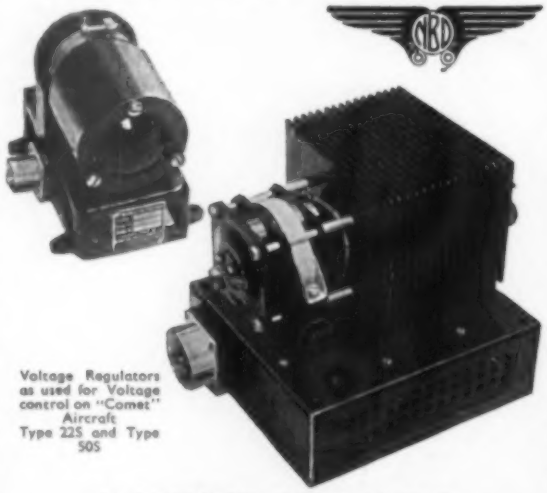

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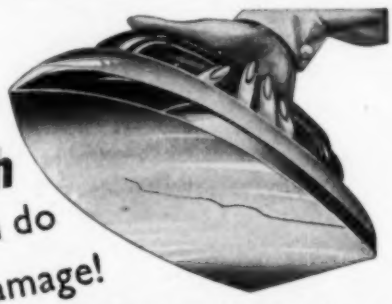

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M. L. THOMAS, Alyth (Tel. 84). Spares, components, accessories for aircraft. Lists available.—M. L. Thomas, Alyth. [1607

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Gipsy Major Gemini
12 months C. of A. Full radio aids.
150 hours on engines and airframe since new.
Condition immaculate both externally and internally.
Many extras.
Immediate delivery.
Inspection invited.

D.H. "Executive" Dove
12 months C. of A.
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Excellent condition. Fully modified to date.
Airframe hours 675 since new.
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Write for further particulars.

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

Application No. 281 from Flightways, Ltd., of Southampton Airport, Eastleigh, Hants, for a normal scheduled service with Dakota and DH89 aircraft, for the carriage of passengers, supplementary freight and mail between Southampton (Eastleigh) and Le Havre and/or Deauville, at a frequency of seven return services per week during a period of seven years from April 1st, 1954.

Application No. 9/2 from Don Everall (Aviation), Ltd., of Elmdon Airport, Birmingham, for permission to include (in addition to the traffic stop at Leicester East (Application No. 9/1) already advertised and considered by the Council) a traffic stop at Coventry on their U.K. internal service (Application No. 9) approved by the Minister of Transport and Civil Aviation for operation on Saturdays between Birmingham (Elmdon) and Jersey until December 31st, 1959.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [1719

PUBLIC APPOINTMENTS

COMMONWEALTH OF AUSTRALIA

Department of Supply

LONG RANGE WEAPONS ESTABLISHMENT

SALISBURY, SOUTH AUSTRALIA

APPLICATIONS are invited for the position of scientific officer, Grade 3, Flight Research Division, Long Range Weapons Establishment, Salisbury, South Australia.

Salary: £1,154 to £1,262 per annum.

Duties: To undertake investigations of an aerodynamic nature concerning supersonic guided missiles.

Qualifications: Degree in mechanical or aeronautical engineering or equivalent qualifications, together with experience in the conduct of aerodynamic investigations, preferably of supersonic flight.

The salaries quoted are Australian currency.

WHERE permanent appointment is accepted, the successful applicant will be eligible to become a contributor to the Commonwealth Superannuation Scheme.

UNDER specified conditions, first class boat fare (if first class berth available) of the appointee and his dependants (wife and dependant children) will be paid by the Commonwealth.

THERE is difficulty in obtaining unfurnished accommodation in the Adelaide area, but the Department is prepared to help suitable applicant with this problem.

WHILE no definite assurance can be given, intending candidates should not let the housing problem deter them in making their initial application.

FURTHER information and application forms obtainable from:

SENIOR REPRESENTATIVE (A.P.7)
Department of Supply,
Australia House,
The Strand, London, W.C.2.

with whom applications must be lodged by March 22nd, 1954. [1723

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R. AND J. PARK, Ltd., 143-9 Fenchurch St., E.C. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

EXPORT PACKING SERVICE Ltd., Imperial Buildings, 56 Kingsway, W.C.2. Phone: Chancery 5121-2-3. Scientific packers to the Services and industry. Specialists in the packing of aircraft and aircraft components. Approved packers for the Admiralty, A.I.D., I.F.V., C.I.A., C.I.S., I.E.M.S., M.o.S. and many foreign Government Departments. [0920

PERSONAL

FERRY twin-engined Miles Aries, England-Australia early April. Vacancy for one passenger prepared to share fuel costs, preferably with some pilot or navigating experience.—Apply, in writing, to the Manager, Australian National Airways Pty. Ltd., 5 Regent Street, London, S.W.1. [1717

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30 CENTRAL CHAMBERS, EALING, W.5
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NEW "Home Study" courses excellent alternative. Full coverage; unique application; finest of kind, modern diagrammatic presentation.

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COMPREHENSIVE flying training for all pilots' licences, ratings and endorsements. Special facilities for instrument, night flying and "twin" conversions. No entrance fee or subscription. M.T.C.A. approved 30-hour course.

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A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass no fee" terms; over 95 per cent. successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., write for 144-page handbook, free.—B.I.E.T. (Dept. 702), 29 Wright's Lane, London, W.8. [0707

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BRITAIN'S AIR UNIVERSITY CAN TRAIN YOU for an airline career. Hundreds of today's airline captains and key maintenance personnel are graduates of this famous establishment. Courses are available for Commercial and Airline Transport Pilots' Licences, Instrument Rating and Maintenance Engineers' Licences.

FOR details of these and other courses, apply to:— The Commandant, Air Service Training, Ltd., Hamble, Southampton. [0970

AERONAUTICAL. Comprehensive full-time technical and practical training for careers in all branches of aviation engineering. Diploma course leads to interesting executive appointments in civil aviation, design and development,draughtsmanship, maintenance, etc. Extended courses to prepare for A.F.R.Ae.S. and A.M.I.Mech.E. examinations.—Write for prospectus to Senior Master, College of Aeronautical Engineering, Chelsea, London, S.W.3. Flaxman 0021. [0919

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

YORK "A" and/or "C" Licensed Engineers required by Field Aircraft Services at Bovingdon Airport, Herts.—Apply personally or in writing to Service Manager, giving details of experience. [1663

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Fine serge-finished drill. Guaranteed shrink-proof. Front, legs and cuffs zip-fastened. Inverted pleat and saddle back. Specially large side, breast and shin pockets and detachable buttons.
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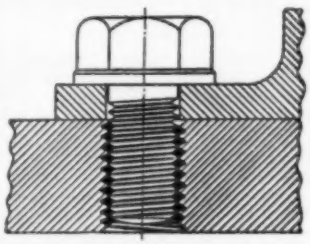

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Preferably with aircraft experience, but men with mechanical, structural or electrical experience also considered. Requirements are mainly for airframe design, but certain vacancies exist for work on wind tunnel models and equipment, and on aircraft instrumentation.

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Preferably with aircraft experience.

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For designing machine fixtures, assembly tools and jigs. Write, giving full particulars including age and salary required, to Personnel Department, Hursley Park, near Winchester, Hants. [1656

THE BRISTOL AEROPLANE CO., LTD.

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REQUIRE senior designer draughtsmen, designer draughtsmen and senior detail draughtsmen for work in connection with ramjets, jet engines and turbo-prop engines.

THIS work includes propulsion systems; fuel pumping and control systems; turbo-driven hydraulic power units; servo mechanisms; main engine design; design of installational features.

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GOOD salary and staff pension scheme; excellent working conditions and welfare facilities.

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A NUMBER of vacancies exist at Filton within the Helicopter Design Organization of the Bristol Aeroplane Company, Limited, for Senior experienced Designers, Technicians, and Aerodynamists.

Qualifications required are:—

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APPLICANTS, if not engineering graduates or members of the Institutions of Mechanical or Production Engineers, should have at least H.N.C.

WRITE in detail to Box 3815. [1732

SAUNDERS-ROE, Ltd., would be pleased to hear from aeronautical draughtsmen interested in employment in the Isle of Wight.

THERE are assurance and pension schemes, and successful applicants will be given practical assistance with housing.

APPLY, stating age, salary, experience, etc., and quoting reference F/2, to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.O.W. [1590

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A VACANCY exists for a scientific officer in the Royal Observatory, Hong Kong.

APPOINTMENT: On probation to the pensionable establishment with salary in the scale £787-£1,406 per annum (approximately), plus overseas pay of between £210 and £280. Variable cost-of-living allowance is also payable. Free return passages for officer and family up to an inclusive cost of five passages. Leave at the rate of one day for every seven days of resident service. Quarters, if available, at rental of one-eighth of basic salary. Income tax at local rates.

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RESEARCH assistant required in the Department of Flight. Good scientific background and sound knowledge of aerodynamics essential. Experience of flight research desirable. Successful applicant to assist in expanding programme of full-scale aerodynamic research. Salary £400 to £600 p.a., according to qualifications and experience. Single accommodation available.—Applications to Recorder, The College of Aeronautics, Cranfield, Bletchley, Bucks. [1726

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TECHNICAL assistant capable of applying the company's ice protection system to customers' requirements, with aircraft industry experience, some knowledge of heat transfer and aerodynamics, and technical education to Higher National Certificate standard.

AERODYNAMICIST with good academic qualifications and preferably with experience in aircraft industry.

APPLY, with particulars of experience and salary expected, to Technical Personnel Officer, D. Napier and Son, Ltd., Luton Airport, Beds. [1728

APPLICATIONS are invited from senior designers and design draughtsmen for work on an interesting new civil aircraft at Southend Airport, Essex.

APPLICANTS should have had experience in one of the following:

RADIO, electrical installations and instrumentation.

FLYING controls.

WING structures.

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STATE experience and salary required.

APPLICATIONS should be addressed to the Chief Designer, Aviation Traders (Engineering), Ltd., Stansted Airport, Stansted, nr. Bishop's Stortford, Essex. [1716

TECHNICAL illustrators (male, senior) required. Considerable practical experience of illustrating for sales brochures and descriptive manuals essential. Good welfare facilities including staff pension scheme.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [0592

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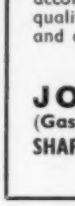

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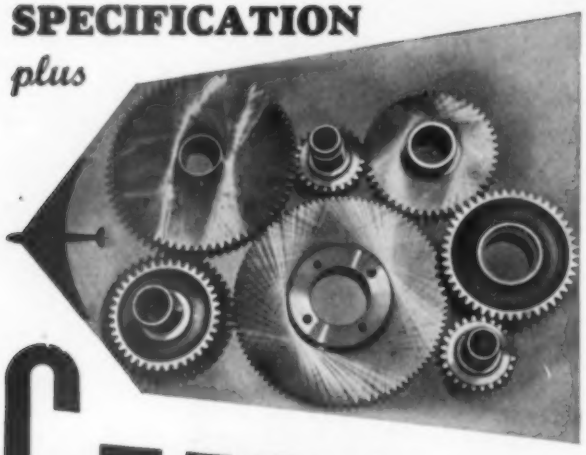

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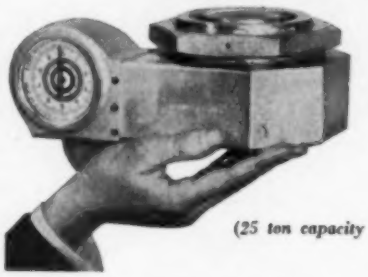

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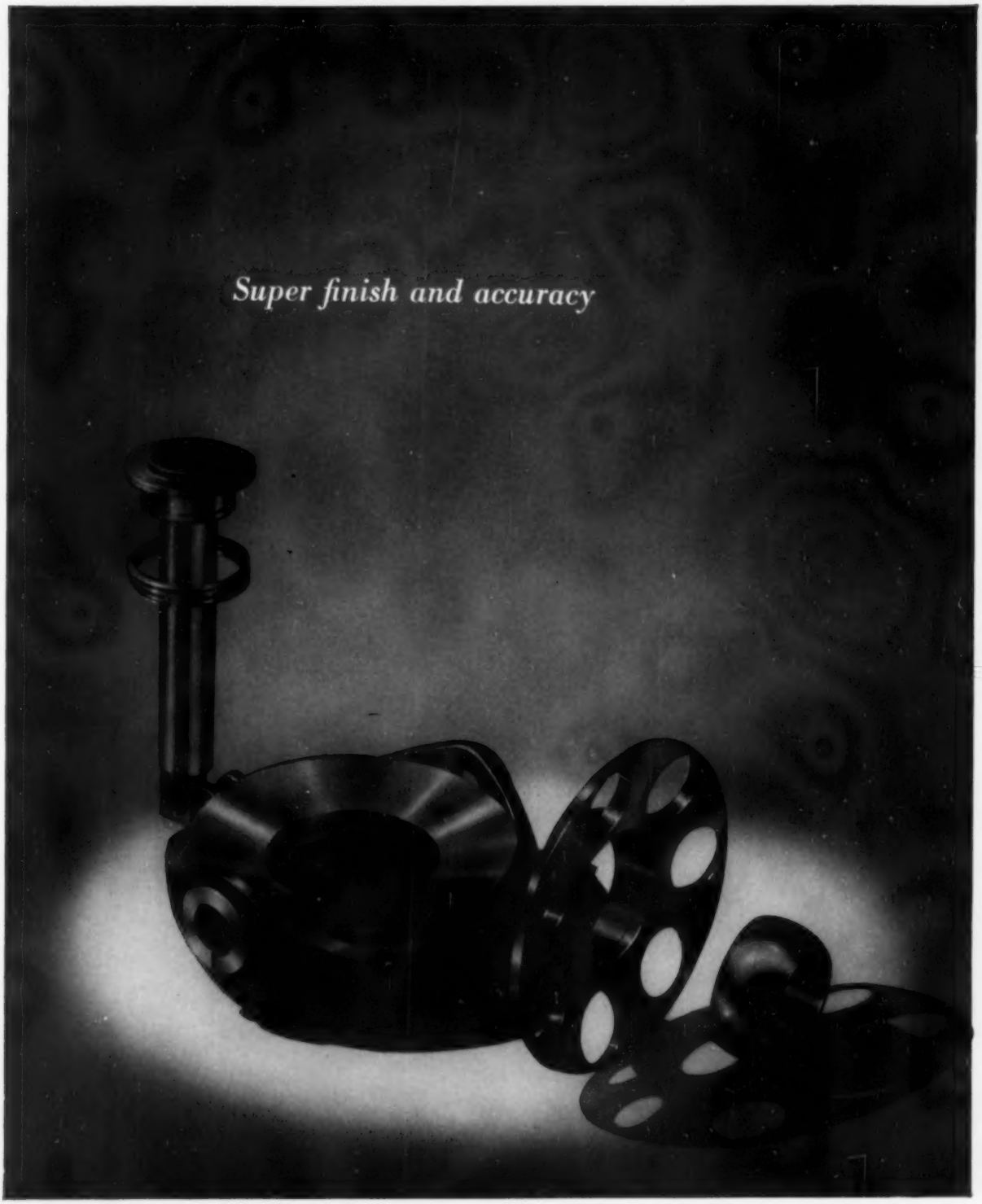

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